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# ABDOMINAL MANIPULATION IN PREGNANCY

A. MACLENNAN

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# ABDOMINAL EXAMINATION AND MANIPULATION

IN

# PREGNANCY

BY

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WITH AN INTRODUCTION
BY
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ESTEEM AND REGARD

THIS LITTLE BOOK

IS

**Respectfully Dedicated by the Author**

TO

MURDOCH CAMERON, M.D., F.F.P.S.G.,

REGIUS PROFESSOR OF OBSTETRICS AND GYNÆCOLOGY

IN THE

UNIVERSITY OF GLASGOW.

# PREFACE.

THE object of this little book is to present to practitioners and students of Medicine a subject which receives, as a rule, only passing attention. An attempt has been made to limit the discussion to what might be included in the terms Abdominal Examination and Manipulation. A certain amount of knowledge is pre-supposed.

To keep down the dimensions of the work, much which might have been legitimately included has been omitted, such, for instance, as the ætiology of the various presentations and positions. Symptoms, apart from the signs elicited by palpation or auscultation, have been intentionally omitted as features in the forming of an opinion as to diagnosis, prognosis or treatment.

The works of others have been freely used: where ideas have been incorporated their source is indicated. Considerable pains have been taken to make the bibliography accurate, and it is hoped that it will be found useful.

The diagrams are nearly all new; but where it is otherwise their origin has been acknowledged.

The writer takes this opportunity of thanking all those who have given their assistance, especially Drs. Carmichael (Hornsey) and MacLellan (Glasgow), who have kindly read over and corrected the proof-sheets.

The author is much indebted to Professor Cameron, Drs. Jardine and Kerr (Glasgow), for suggestions, and for the facilities which enabled the photographs to be taken.

The trouble taken on the author's behalf, and the interest shown by the librarians of the British Medical Association Library, the Faculty of Physicians and Surgeons' Library, the Medico-Chirurgical Society's Library, the Obstetrical Society's Library, and the University of Glasgow Library, have been much appreciated.

A. MACLENNAN.

Glasgow, *May*, 1902.

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# INTRODUCTION.

Since graduation, the author has spent his time to good purpose in viewing the fields of Obstetrics and Gynæcology. With a wise reserve he has abstained from pressing crude notions into notice, but has waited until experience justified him in expressing his opinion on the methods and practice of the various hospitals where he has been a keen and intelligent observer.

He is in no sense dogmatic, and does not commit himself to the methods of others on all points quoted, but has fairly stated the opinions expressed by many up-to-date accoucheurs as to the advantages to be gained in obstetric practice by careful palpation as a supplement to internal examination.

He has demonstrated the value of palpation in pregnancy, single or plural, in the diagnosis of presentation and positions, in estimating the development of the fœtus and in the detection of abnormalities.

For the purpose of illustration, several plates are given which will be invaluable in making clearer many important points which might otherwise escape due attention.

I consider this a work which does the author great credit, and have the greatest pleasure in recommending it to those who wish in the fullest and easiest way to make themselves acquainted with this method of examination.

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# CHAPTER I.

## INTRODUCTION.

Argument in Favour of the Abdominal as Distinct from the Vaginal Method of Conducting Labour, etc.—How it Affects the Prognosis as Regards Sepsis—Views of Various Authorities as to How Much of the Internal Examination may be Supplanted by the External—With Regard to the Correctness of the Diagnosis—Comparative Worth of the Two Methods.

Information from the External Method—Indications for the Vaginal Examination Given by the External—Recommendation on Account of the Value in Treatment.

A COMPARATIVELY recent development, at least in this country, in the Science of Obstetrics, is the prominence given to abdominal palpation in pregnancy and labour, as a means of diagnosis and treatment.

There are many methods of diagnosis and treatment possible, but the one of greatest utility is that by which the practitioner is enabled to conduct any labour in a safer but still rational way.

The commoner way of conducting a labour is to make frequent vaginal examinations, the object and utility of which are very doubtful. If the phenomena of labour are to be interpreted and appreciated solely from this method of examination, it is only natural that these examinations, on which so much is made to depend, should be resorted to with a frequency corresponding to the length of the labour, and the time at the disposal of the accoucheur.

What may possibly be gained by a vaginal examination is a complete knowledge of the pelvic canal and outlet, with tactile impressions produced by a small part (the presenting part) of the fœtal surface on the point of one or more fingers, but the actual information gained is usually very far short of this, as every obstetrician can testify. In the paper of Leopold and Spörlin[1] on this subject this point is well illustrated; they state that their pupils have made even twenty examinations without diagnosing contracted pelvis, while one minute's palpation has showed that there were grounds for suspecting this condition. One case is known to the author where even anæsthesia was required before the contracted pelvis could be detected from the vagina; while from the abdomen the true condition was easily recognised without any anæsthetic. Leopold and Orb[2] refer to the mistakes in diagnosis made during palpation.

It is astounding that any one can persuade himself to dispense with all information other than that derived from the vaginal examination.

It is, of course, not to be understood that abdominal palpation is meant entirely to supplant vaginal examination; but what is asserted is that a proper understanding of the forces of nature cannot be arrived at, and much less can a proper course of treatment be adopted, from such necessarily inadequate information as is got from the internal examination.

How few practitioners expose and thoroughly apply to the pregnant abdomen all the methods of physical diagnosis at their disposal before resorting to the conventional vaginal examination. No one will doubt that the more vaginal examinations made, the less likely is the puerperium to be uneventful, and this even though the hands of the observer be as aseptic as possible. During examination or instrumentation the vaginal flow is reversed, and material which has been stagnating at the introitus may be inoculated into the cervix. This aspect of the subject has been well brought out by Kosminski,[1] while Leopold and Pantzer,[2] Leopold,[3] and Leopold and Goldberg [4] advocate the abdominal investigation from the point of view of prophylaxis against puerperal fever. Müllerheim [5] mentions that palpation cannot cause infection. Is it then not imprudent to continue teaching and practising the vaginal method at the expense of the more elegant and scientific abdominal?

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[1] Leopold und Spörlin, "Die Leitung der regelmässigen Geburten nur durch äussere Untersuchung," *Archiv für Gynäkologie*, Bd. xlv., S. 337.

[2] Leopold und Orb, "Die Leitung normaler Geburten nur durch äussere Untersuchung," *Archiv für Gynäkologie*, Bd. xlix., S. 304.

From time to time in the journals there have been those who, like voices crying in the wilderness, have lamented the lack of attention to this branch of physical examination during pregnancy and labour. In 1886 the *Lancet*[6] had an editorial article on abdominal palpation, in which the want of systematic teaching was deplored. In the same journal[7] in 1858 and again in 1872[8] the external exploration is advocated. The first edition of Pinard's work was published in 1876, and the second in 1889,[1] and even yet there is no English book on the subject, other than a translation from the German.[2] Mundé[3] in America has drawn attention to the scant English literature referring to abdominal palpation, and he has published an essay on the subject. Both Pinard and Mundé point out that external palpation has an interesting history, which reaches back to antiquity. It is abundantly evident from these historical sketches that this country has not greatly interested itself in the subject.

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[1] Kosminski, "Beitrag zum aseptischen Verfahren bei gewissen Geburtshülflichen Operationen," *Centralblatt für Gynäkologie*, 1897, No. 29, S. 913.

[2] Leopold und Pantzer, "Die Beschränkung der inneren und die grösstmögliche Verwerthung der äusseren Untersuchung in der Geburtshülfe," *Archiv für Gynäkologie*, Bd. xxxviii., S. 330.

[3] Leopold, "Dritter Beitrag zur Verhütung des Kindbettfiebers," *Archiv für Gynäkologie*, Bd. xxxv., S. 149.

[4] Leopold und Goldberg, "Ueber die Entbehrlichkeit der Scheidenausspülungen und Auswaschungen bei regelmässigen Geburten und über die grösstmögliche Verwerthung der äusseren Untersuchung in der Geburtshülfe," *Archiv für Gynäkologie*, Bd. xl., S. 439.

[5] Müllerheim, *Die äussere Untersuchung der Gebärenden*, Berlin, 1895.

[6] *Lancet*, vol. ii., 1886, p. 72.

[7] Murray, "On the Position of the Fœtus *in Utero* by Means of External Palpation," *Lancet*, 1858, vol. i., p. 262.

[8] Edis, "On the Systematic Examination of the Abdomen, with a View to Rectifying Malpresentations of the Fœtus during Labour," *Lancet*, 1872, vol. ii., p. 915.

Lately in the *British Medical Journal*[4] it has been pretty fully discussed how far antiseptic and aseptic precautions are necessary, and to what extent they should be carried. Those who object to the applications of antiseptics, etc., to their hands and the vulva as unnecessary interference, belong as a rule to the same class as those who make repeated vaginal examinations. Surely such are more guilty of unjustifiable interference than those who take precautions, however stringent, to prevent infection from entering the uterine cavity *viâ* the vagina.

Ahlfeld,[5] in a paper on the abandonment of the vaginal for the abdominal examination, protests against the extreme views of those who say that the former is entirely unnecessary. This he does chiefly on the ground that practice is required in internal examinations, and also that if a strict asepsis and antisepsis be employed, a few vaginal examinations do no harm. This is the practice in his clinic, and he affirms that the results are not impaired thereby. Hofmeier[1] thinks that one cannot arrive at a positive conclusion after an external examination, and further that internal examination is safe if the antisepsis is thorough. For educational purposes he also recommends the internal examination to be practised. Frommel[2] agrees with Hofmeier, but also thinks that with experience the vaginal investigations can be reduced in frequency or even dispensed with entirely: without such experience the internal examination must be resorted to. Mulert's[3] main objection to the entire management of labour by abdominal palpation, etc., is that to carry out the method great practice is required; while Pinard states the reverse. Schröder[4] says the novice is less likely to make mistakes from adoption of the external examination than of the internal. Probably the general practitioner would require to have much more experience than he has hitherto had if vaginal examinations are to be altogether neglected. Warden,[5] in a paper in the *Glasgow Medical Journal*, writes that in comparison with the vaginal, the abdominal method is much inferior. The vaginal exploration, however, requires for its interpretation almost as much practice as, if not indeed more than, palpation. The truth is that these two methods must not be considered rival, but complementary—information not got by one means being usually furnished by the other. There can be no doubt, however, that if the practitioner be limited to one method or the other, by far the more reliable information is to be got by the abdominal.

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[1] Pinard, *Traité du palper abdominal au point de vue obstétrical et de la version par manœuvres externes*, Paris, 1889.

[2] Credé and Leopold, *A Short Guide to the Examination of Lying-in Women* (Extract from the German), London, 1894.

[3] Mundé, "Diagnosis and Treatment of Obstetric Cases by External (Abdominal) Examination and Manipulation," *American Journal of Obstetrics*, 1879, vol. xii., p. 490; 1880, vol. xiii., p. 707.

[4] 1898, vol. ii., p. 927 and p. 1009 (Correspondence).

[5] Ahlfeld, "Die Bedeutung der äusseren Untersuchung der Gebärenden gegenüber der inneren," *Deutsche Medicinische Wochenschrift*, 1896, No. 44.

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[1] Hofmeier, "Zur Prophylaxis der Wochenbettserkrankungen," *Deutsche Medicinische Wochenschrift*, 1891, No. 49, S. 1321.

[2] Frommel, "Zur Prophylaxe der Wochenbettserkrankungen," *Deutsche Medicinische Wochenschrift*, 1892, No. 10, S. 202.

[3] Mulert, "Ueber die Einschränkung der inneren Untersuchung der Gebärenden," *Deutsche Medicinische Wochenschrift*, 1897, No. 7, S. 108.

[4] Schröder, *Geburtshülfe*; Olshausen and Veit, 1888, p. 135.

[5] Warden, "Abdominal Examination in Pregnancy and Labour: a Critical Estimate of its Value," *Glasgow Medical Journal*, 1896, p. 442.

Warden, in the paper referred to, gives a list of conditions of which the presence cannot be ascertained by abdominal palpation. They are as follows :—

1. Prolapse of the cord.
2. A band complicating head presentation.
3. Œdema or prolapse of the anterior lip of the cervix.
4. A small pedunculated prolapsed ovarian cyst.
5. A uterine or other tumour in Douglas' pouch.
6. Exostosis of the sacrum.
7. Narrowing of the outlet as in slight osteo-malacia.
8. Marginal placenta prævia, where the bulk of the placenta is situated posteriorly.

As an offset to the above, the following list contains a number of conditions of which the presence cannot be made out by the ordinary vaginal examination :—

1. Abnormalities in the pains.
2. High position of the head.
3. Transverse presentations before dilatation of the cervix.
4. Twins, etc.
5. Early rupture of the membranes.
6. Position of the presenting part before dilatation of the cervix.
7. Size of the presenting head.
8. The presence of active movements.

In addition to these eight conditions positive information can be gained by auscultation, combined with palpation, of any pressure on the cord. A glance at the two series will show which yields the larger amount of information, and the relative value of the two methods. Obviously palpation at the onset of labour cannot foretell the difficulties which may be met with towards the end of labour ; but the cessation of progress during labour is quite capable of being diagnosed by palpation.

In the majority of births examination is made to find out if the conditions are normal or not, and it is just in the separation of abnormal from normal that abdominal observation comes to enable the practitioner to decide to which class the case belongs.

Leopold and Sporlin[1] make the following claims for the external method :—

1. There is no chance of infection.
2. Modesty is not aggrieved.
3. Risk of early traumatic rupture of the membranes is avoided.
4. A little effort and practice soon teaches palpation. It can be practised more freely than the internal examination, and is much more æsthetic.
5. In the majority, the presentation and the position can be recognised.
6. Also the progress can be gauged.
7. Often abnormalities are discovered at an earlier stage.
8. The divergence can be immediately recognised in a case of contracted pelvis, either at the onset, or after labour has begun.
9. If abdominal palpation is satisfactory and the internal examination still necessary, the attention may be confined to the soft parts—the os, membranes, etc. The internal examination can then be much more quickly performed.

Palpation of the abdomen ought thus to be the first part of the examination of the pregnant woman. It gives an unbiased indication whether it requires to be supplemented by other means, such as the investigation per vaginam, or examination under an anæsthetic.

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[1] Leopold and Spörlin, *loc. cit.*, p. 2.

Müllerheim[1] gives the following as indications for the internal:—

A. From the maternal side.
  1. When the head is not engaged in primiparæ.
  2. When the head does not descend in multiparæ after some hours of labour pains.
  3. In abnormal pelves.
  4. During dilatation of the cervix (cervixdehnung).
  5. Where there is hæmorrhage.
  6. In cases of eclampsia.

B. From the fœtal side.
  1. Errors in the position of the head.
  2. Irregular heart sounds.
  3. Prolapse of the cord.
  4. Prolapse of an arm.
  5. Appearance of meconium, with presentation of the head.
  6. Premature rupture of the membranes.
  7. In all cases where abdominal examination yields negative results.

Ahlfeld[2] thinks these indications too few.

To render successful such practices as prophylactic version in breech cases, or the method of reduction (recommended by Schatz) in facial presentations, an exact knowledge of the attitude, presentation and position of the child is necessary.

While palpating to diagnose presentation and position many little points of purely scientific interest are to be observed. The search after these little details educates the fingers, and amply repays the trouble to patient and examiner; such, for instance, as the presence of small ovarian cysts, or myomata of the uterus.

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[1] Müllerheim, *loc. cit.*, p. 3.

[2] Ahlfeld, *loc. cit.*, p. 4.

Probably the ideal method of conducting a labour would be to utilise information gained by abdominal investigation made three or four weeks prior to the onset of labour. If all were found satisfactory, one vaginal examination, and one only, should be made immediately after rupture of the membranes. Mullert[1] mentions that in Gusserow's clinic this is the procedure followed in normal cases. Such an examination made after palpating the abdomen, as has been pointed out by Leopold and Spörlin,[2] can be very rapidly performed, because only the pelvic outlet need be investigated. In Müllerheim's essay the observation of every factor which may be useful in diagnosis, treatment and prognosis is advocated, and this is surely the more truly scientific position.

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[1] Mullert, *loc. cit.*, p. 5.

[2] Leopold and Spörlin, *loc. cit.*, p. 2.

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# CHAPTER II.

## DIAGNOSIS OF PREGNANCY.

Entrance of the Fundus into the Abdomen—Rate of Its Ascent, Its Regularity—Consistence—Contractions, Significance of—Round Ligaments and Appendages Contents: Liquor Amnii, Placenta—Fœtus, Its Characters, Movements—Auscultation Signs.

It is only possible to recognise the pregnant uterus abdominally after the third month. It is commonly, but probably erroneously, said that the abdomen is flattened till the third month; owing to the descent of the uterus. Parvin[1] draws attention to this point and refers to the writings of Tarnier,[2] who says: "The descent of the uterus is far from constant; in a great number of women the fundus of the uterus from the first weeks of pregnancy passes the superior pubic margin and the cervix does not descend". When the uterus begins to rise out of the pelvis the abdominal prominence is due to the displaced intestine. Till the fundus rises well out of the pelvis the external methods of physical diagnosis cannot be applied to it.

The pregnant uterus may be recognised by its various characters.

1. The position of the fundus, just above the symphysis, is a sign of some value. As it rises in the abdomen, the fundus tends to take a more lateral position. Whatever the explanation be, the lateral flexion is almost invariably towards the right. Where the fundus requires to rise higher than the liver will

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[1] Parvin, *The Science and Art of Obstetrics*, 1887, p. 349.

[2] Tarnier et Chantreul, *Traité des Accouchements*, vol. i., p. 185, 1888.

permit (as in contracted pelvis) upward expansion can only take place at the expense of the stomach, which therefore becomes more embarrassed than usual. The rate of growth of the uterus is treated of elsewhere (see p. 23). The regularity of the growth is of some importance in the diagnosis. In the first part of pregnancy, intestine is rarely found in front of the uterus; in the second part it is abnormal to get, on percussion, the tympanitic note of the intestine anterior to the body or lower part of the fundus.

2. As regards consistence, the gravid uterus has a character of its own, which might be described as sodden. Fluctuation is not a normal sign; but it may be elicited in hydramnios. Over the area of the placental attachment the soddenness is more marked, and the natural elasticity less so.

3. Painless contractions observed during palpation, though constituting a sign of much value, are liable to be misinterpreted. Braxton Hicks[1] brings forward this sign, which, when accompanied by amenorrhœa, is produced by no other condition than conception. Thus Pinard[2] remarks that though a soft and contractile tumour is found occupying the pelvis, it cannot be positively said to be the uterus; for a distended bladder (see p. 65) or a myoma may harden under the hand. During threatened abortion the uterus sometimes feels like a myoma, due to a tonic contraction; this is a sign of bad import as regards the further continuance of the pregnancy.

4. The appendages, when they are found, show the swelling under observation to be the uterus. As a rule, on account of the right flexion and rotation, the left tube and ovary are most readily palpated. Both tube and ovary are located after palpating the round ligament, which in almost every case is very easily found. Where the uterus is greatly distended and

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[1] Hicks, "On the Contractions of the Uterus during the Whole of Pregnancy," *Lancet*, 1888, vol. i., p. 65.

[2] Pinard, *loc. cit.*, p. 4.

the abdominal walls are thinned, these structures are the more readily identified, and it is just in such cases that the uterus has to be differentiated from ovarian and other swellings. There is nothing about the adnexa at these times which is diagnostic, but they denote for certain that the tumour is uterine.

5. A diagnosis of the pregnant uterus can be made after identification of the contents. The liquor amnii and the placenta give some of their consistence to the uterus; but it is the observation of the fœtus that gives certainty to the surmise. The various fœtal parts are capable of identification; small subserous myomata should not be mistaken for them. Of the various parts of the fœtus which are palpable, the head gives, *par excellence*, the points most characteristic and diagnostic. Ballottement or passive movement can only be got from the fœtus as a whole during the first half of pregnancy. During the second period the various freely moving parts alone, as the head, breech or a leg, can be got to ballotte. About the fourth month passive movements are best sought for over the region of the umbilicus; for then the head usually rests in the fundus, and the fundus is then at the level of the navel. Pinard remarks that where the fœtus is dead, the uterus becomes less evident; but it remains palpable, as also does the child. In that event the liquor amnii absorbs: it never increases.

Active movements, the sign of a living child, where not spontaneous, are easily induced by a sudden gentle poke given to the fœtus. Intestinal contractions produce a different sensation from those of the living child.

6. The auscultation signs furnish unquestionable evidence, but their absence is not quite negative. These signs give weight to the many so-called probable signs of pregnancy.

The gravid uterus has to be distinguished from all other abdominal tumours, especially ovarian, uterine, renal, intestinal, etc. Where there are no symptoms, a little delay, during which frequent careful observations are made, will clear up the diagnosis. Before operative interference on an abdominal swelling is entertained, normal pregnancy must be definitely excluded; to arrive at a decision chloroform may be necessary (chloroform, as apart from ether, probably giving the better abdominal condition).

# CHAPTER III.

## DIAGNOSIS OF MULTIPLE PREGNANCY.

Twins: Inspection, Palpation, Conformation of the Uterus—Fixation of one Fœtus—Unequal Tenseness—Fœtal Movements—Two Sets of Limbs—Oblique Presentation—Differential Diagnosis. Mensuration: Girth of the Abdomen—Distance of Fœtal Poles. Auscultation: Two Areas of Maximum Intensity—Two Rates—Heard by Two Observers Simultaneously—Or Heard by the Same Observer with Differential Stethoscope.

Triplets: Same Reasoning and Methods Employed.

## DIAGNOSIS OF TWINS.

A DIAGNOSIS of twins can readily be made by abdominal examination. It is evident that abdominal palpation is little practised from the fact that the antepartum diagnosis is seldom certain enough to induce the making of preparations for the arrival of more than one child. It is usually when the placenta is to be expelled that the presence of another child is discovered.

Mundé[1] asserts that the diagnosis is only possible after a combined internal and external examination. One head is found presenting, while there is another in the abdomen, and while the abdomen is large, the presenting part is small.

The diagnosis may be made from the following data elicited by:—

1. *Inspection.*—The presence of twins is occasionally surmised, if the abdomen happens to be observed at all, from its

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[1] Mundé, *loc. cit.*, p. 4.

excessive size. Sometimes the presence of the fœtal movements, occurring at widely separated areas, may be helpful in arousing a suspicion of the condition.

2. *Palpation.* — It is from the practice of this that the presence of twins can be most easily recognised. The shape of the uterus may be unusual. There may be a groove at the fundus, as has been pointed out by Küneke,[2] or the conformation of the uterus may be irregular. The visible increase in size noted under the first head may be due to hydramnios, to twin pregnancy or to twin pregnancy with hydramnios in

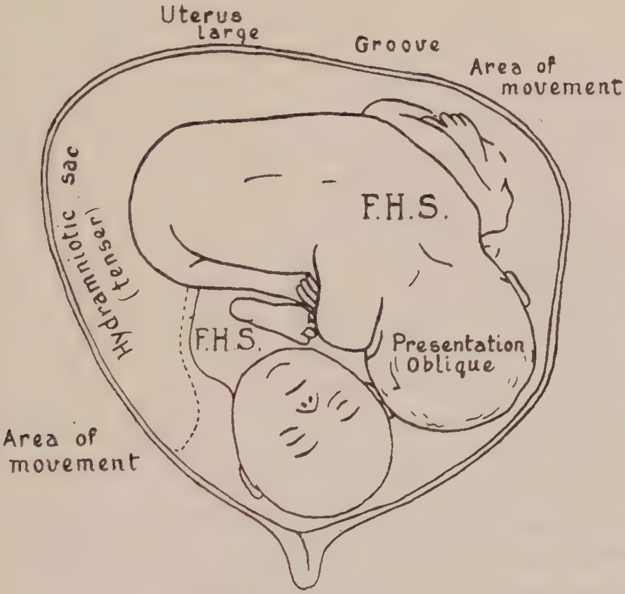

FIG. 1.[1]

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[1] By kind permission of the proprietors of the *Scottish Medical and Surgical Journal.*

[2] Küneke, "Ueber das Erkennen der Zwillings-schwangerschaft," *Monatsschrift für Geburtskunde*, Göttingen, 1861, Bd. xxi., S. 319.

one sac (Pinard). The presence of an excess of liquor in one sac may also account for the abnormality in the shape of the uterus. Pollosson[1] draws attention to the fact of the fœtus in the sac containing the normal amount of liquor being more or less fixed by the pressure of the liquor in the hydramniotic sac. The tenseness in one sac may be different from that of the other, different parts of the uterus being of unequal resistance.

Fœtal movements, produced by more than one set of limbs, and felt at different places, are more or less characteristic.

The observation of two sets of limbs, of more than two poles or of two trunks, gives evidence of twins. Finding an oblique presentation, where the one pole does not permit itself to be pushed into the pelvis, should make the examiner aware that, at least, there is a disproportion between the size of the presenting part and the pelvis. Contracted pelvis, hydrocephalus, prolapsed tumour, placenta prævia, short cord, or twin pole, should be thought of, and a differential diagnosis attempted.

(*a*) Contracted pelvis, if the woman be a multipara, will be indicated by the history, or by the presence of deformity elsewhere, such as lameness, etc., by high position of the uterus, and by the facility with which the presenting part may be displaced to the opposite side, etc.

(*b*) Hydrocephalus is self-evident if of a marked type, and if the head presents its size can be estimated, as it sits over the symphysis. Where the breech presents the progress of labour is not interfered with till the after-coming head attempts to engage. In breech presentations, especially in primiparæ, hydrocephalus should be particularly looked for.

(*c*) Prolapsed tumour will give the signs of obstruction in the pelvis, but the rest of the supposed twin will be conspicuous by its absence.

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[1] Pollosson, "Sur la diagnostic de la grossesse gemellaire dans certain cas d'hydramnios," *Lyon Médical*, 1898, t. lxxxix., p. 14.

(*d*) Placenta prævia usually gives notice of its presence by the advent of unavoidable hæmorrhage. Where the placenta is placed anteriorly it masks the presenting part, and it may also be recognised on account of its peculiar consistence.

(*e*) Short cord preventing engagement, as a rule, does so only before rupture of the membranes. It gives the sign of contracted pelvis where the head ballottes freely over the brim, but the auscultation signs are characteristic.

As an internal examination will be necessary in any case before treatment, the provisional diagnosis can be confirmed during this examination. The presence of a dead and atrophic ovum will, in most cases, be impossible of diagnosis by either method.

3. *Mensuration.*—The enormous size often attained by the uterus containing more than one ovum is remarkable. It is due commonly, as referred to already, to the presence of hydramnios in one or both sacs. The normal girth of a pregnant woman's abdomen (at the level of the umbilicus) is about 36 inches (Herman).[1] Hecker and Buhl[2] say 100 cms., Gassner[3] places it at 100·5 cms. A large increase in this measurement is to be noted as pointing towards hydramnios pure and simple, or to multiple pregnancy. Ahlfeld[4] has pointed out that if two fœtal poles are found separated from each other by more than 30 cms. (11¾ inches), then these two poles cannot belong to the same fœtus.

4. *Auscultation.*—Two areas of maximum intensity of the heart sounds, separated by an area of silence, point towards there being more than one ovum. Hearing, however, two fœtal hearts having different rhythms is conclusive evidence.

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[1] Herman, "A Clinical Lecture Delivered at the London Hospital," *Clinical Journal*, August, 1900, p. 227.

[2] Hecker und Buhl, *Klinik der Geburtskunde*, 1861, S. 12.

[3] Gassner, *Monatssch. f. Geburtsk.*, Bd. xix., S. 1.

[4] Ahlfeld, *System of Gynæcology and Obstetrics by American Authors*, vol. i., part 1, p. 56.

The counting of two rates is not sufficient to give rise to more than a suspicion unless performed simultaneously by two individuals as recommended by Nägele[1] and Ahlfeld.[2] Where the hearts are heard beating together but with different rhythms there is no question about the condition. A differential stethoscope is most useful in this connection.

Very much the same reasoning applies to the diagnosis of triplets. In both, owing to the exaggerated size of the abdomen, an error may arise regarding term, but delivery takes place commonly before the calculated time. The various points may be noted in the diagram, which represents an actual case, slightly modified so as to illustrate as many points in the diagnosis as possible.

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[1] Nägele, *Die Geburtshülfliche Auskultation*, 1838.

[2] Ahlfeld, "Zur Diagnose der Zwillingschwangerschaft," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1896, Bd. xxxv., S. 180.

# CHAPTER IV.

## HYDATIDIFORM MOLE—EXTRA-UTERINE PREGNANCY.

1. Hydatidiform Mole: Diagnosis—Signs of Pregnancy—Abdominal Swelling—Want of Correspondence to Term—Abnormal Consistence—Contents Give Negative Signs—Discharge.
2. Extra-uterine Pregnancy: Signs of Pregnancy—Uterus Displaced—Signs of the Fœtus—Death of the Fœtus—Pain—Diagnosis Very Difficult.

## HYDATIDIFORM MOLE.

The actual diagnosis of this state from palpation alone will be in most cases tentative; still the knowledge that palpation can indicate the probability of such a condition is of the greatest value. Vesicular mole commonly gives rise to abortion before it enlarges the uterus sufficiently to bring it into the abdomen.

When, however, the uterus forms an abdominal tumour the diagnosis may possibly be made from the consideration of the following points:—

1. The probable signs of pregnancy will be usually present.

2. The abdominal swelling has to be recognised as the distended uterus.

This may be done when the various characters of the uterus admit of identification; thus the position of the swelling will coincide with that of the uterus; further, the observation of the round ligaments and the adnexa will determine the nature of the tumour.

There is sometimes some want of correspondence between the size of the uterus and the term of the pregnancy, though this is not essential. Usually the uterus is abnormally large, and the swelling which has been detected at the first examination is found on subsequent investigation to have increased too rapidly to be accounted for by the normal expansion of the uterus alone. Less commonly is the uterus noted as being too small (Pinard, Lusk).[1]

The consistence of the uterus is abnormal. Leishman[2] describes this as being "peculiarly doughy and boggy," and he affirms that this sign is characteristic. The lower uterine segment is found by Lusk to be unnaturally tense. Montgomerie[3] reports a case where the uterus, distended by a hydatid mole, was of a scirrhus-like hardness. Poten[4] describes an irregular contraction of the uterus, and mentions one case where such a hardened portion of the uterus was mistaken for a myoma. These contractions last for a considerable time. Ordinary generalised contractions may of course be present, but such irregular contractions as referred to by Poten do not occur in normal cases.

3. The contents of the uterus being different from usual the signs of a developed fœtus are absent, and these negative signs become of importance. Leishman draws attention to the "absence of that irregular hardness which indicates the prominences of the fœtus". Fœtal parts are not palpable at all. This sign is valuable, especially when associated with a rapid increase in the size of the uterus, for differentiating this condition from simple death of the fœtus. Also in death of the fœtus the liquor amnii becomes rapidly absorbed. Another abnormal condition associated with a rapid increase in size of the tumour

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[1] Lusk, *Science and Art of Midwifery*, 1896, p. 301.

[2] Leishman, *A System of Midwifery*, 1880, p. 230.

[3] Montgomerie, *Symptoms of Pregnancy*, 1837, p. 110.

[4] Poten, "Beitrag zur Diagnose der Blasenmolenschwangerschaft," *Monatsschrift für Geburtshülfe und Gynäkologie*, 1901, Bd. xiv., Heft 3; *Münchener Med. Wochensch.*, 1901, No. 49, S. 1978.

from excess of liquor is extra-uterine pregnancy; but this condition is accompanied by very different physical signs from those characteristic of vesicular mole.

Only in the exceptional cases where the fœtus has not died can the heart sounds be heard, and this indistinctly. Usually the death of the fœtus takes place early, and the development of the mole proceeds; in some instances the fœtus continues to develop, masked and blanketed by the mole; in such only is it possible to auscultate the fœtal heart, but even in these the sounds are rarely audible.

4. The continuous sanious discharge, which is suspiciously characteristic of this state, becomes diagnostic when it contains the pathognomonic grape-like bodies.

## EXTRA-UTERINE PREGNANCY.

Like vesicular mole this is rare as an advanced condition, and its early symptoms usually call for active treatment. In only a few cases do the abdominal signs become sufficiently well marked to be of any value in the diagnosis during the earlier months. Occasionally in one iliac fossa, in a thin subject, one is able to make out the enlarged uterus as it is pushed to one side by the extra-uterine tumour, which may be noted on subsequent examination to have enlarged. This lateral displacement of the uterus by the tumour is of considerable importance in the diagnosis, and it is easily felt on bimanual examination.

In a more advanced state the diagnosis from the abdominal aspect may be made after examining for the following features:—

1. There may be present the probable signs of pregnancy.

2. The uterus is displaced laterally; it may be more or less enlarged. Where the abdominal walls are thin it is to be found on deep palpation.

3. The fœtal sac, having a consistence differing from an

ovarian cyst or a myoma, is to be found lying asymmetrically, and more or less fixed. Pinard[1] affirms that the sac may contract during palpation, and Küstner supports this.[2]

4. Later on the evidence of fœtal parts, active and passive movements, with auscultatory signs, make the diagnosis certain.

5. On the death of the fœtus the liquor may either increase or diminish. Ultimately, when all the liquor becomes absorbed and the various fœtal parts get moulded together, they are very difficult to recognise. If the fœtus happens to be macerated, crepitation of the skull bones may be elicited (Pinard), and of course the signs of the death of the fœtus will be present.

6. During the whole course of pregnancy pain is often a prominent symptom, and the tenderness of the abdomen may prevent a thorough investigation without the aid of an anæsthetic.

[1] Pinard, *loc. cit.*, p. 4.

[2] Küstner, *Müller's Handbuch der Geburtshülfe*, vol. ii., S. 541 (from Lusk).

# CHAPTER V.

## GROWTH OF THE UTERUS.

Measurements from the Symphysis—With Reference to Term—Rate of Growth—Circumstances Influencing—Changes in Position during Growth—Change in Consistence—Significance of.

In the following table Spiegelberg[1] has given the height of the fundus at the various periods; measurement being performed by a tape—the symphysis being taken as the fixed point; side by side with these are placed Ahlfeld[2] and Sutugin's:—[3]

| Spiegelberg. | | | Ahlfeld. | Sutugin. |
|---|---|---|---|---|
| | | cms. | cms. | cms. |
| 22nd to the 26th week— | | 24 | — | — |
| 27th | ,, | — | 19·1 | 19 |
| 28th | ,, | 26·7 | 20·3 | 20·1 |
| 29th | ,, | — | 20·2 | 21·5 |
| 30th | ,, | 28·4 | 21·5 | 22·4 |
| 31st | ,, | — | 21·6 | 21·9 |
| 32nd | ,, | — | 21·7 | 22 |
| 33rd | ,, | 29·5 to 30 | 22·3 | 22 |
| 34th | ,, | 31 | 23·4 | 23·2 |
| 35th | ,, | 31·8 | 23·5 | 23·8 |
| 36th | ,, | 32 | 24 | 24 |
| 37th | ,, | 32·8 | 24 | 24·15 |
| 38th | ,, | 33·1 | 25 | 24·5 |
| 39th | ,, | 33·7 | 25·7 | 24·9 |
| 40th | ,, | ,, | 26·1 | 25·4 |

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[1] Spiegelberg, *Textbook of Midwifery*, Sydenham Society's translation, vol. i., p. 67.

[2] Ahlfeld, "Bestimmungen der Grosse und des Alters der Frucht vor der Geburt," *Archiv für Gynäkologie*, Bd. ii., S. 353; "Die Technik der Schwangern Untersuchung," *Volkmann's Klinische Vorträge*, No. 79.

[3] Sutugin, "On the Means of Ascertaining the Length of Gestation by Measurement of the Fœtus and Gravid Uterus during the Second Period of Pregnancy," *Edinburgh Medical Journal*, 1875, p. 869.

According to Ahlfeld, the fundus rises during the whole of gestation and does not sink in the course of the last few weeks. Mundé[1] says the descent of the fundus towards the end of pregnancy is coincident with the entrance of the presenting part into the pelvis.

Ahlfeld's averages are confirmed by Sutugin, who accounts for his measurements being lower than Ahlfeld's because Russian children are heavier for their length than the German. The measurements of Spiegelberg are higher pitched than the other sets; but they were taken with a tape, while Ahlfeld and Sutugin used calipers. Both these writers hold that such measurements furnish a means whereby the period of pregnancy may be determined; and also that the length of the child may be arrived at by doubling the distance between the pubis and the fundus. Zweifel[2] thinks that individual differences are too great to allow of such accuracy. Schröder[3] says that the length of the child is proportional to the age, while Germann[4] states the reverse. For all practical purposes such measurements are only approximate and are of corresponding value.

Sutugin and Ahlfeld both agree that the fundus stands higher in a contracted pelvis; and also in breech presentations.

Sutugin and Gassner[5] state that the uterus is broader in multiparæ; due probably to the larger amount of liquor amnii.

From a clinical point of view the term of gestation is often reckoned as follows:—

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[1] Mundé, *loc. cit.*, p. 4.

[2] Zweifel, "Ueber die Bestimmung der Schwangerschaftszeit durch Messungen," *Archiv für Gynäkologie*, Bd. xxii., Heft 3, S. 491.

[3] Schröder, *Geburtshülfe*, vierte Auflage, 1874.

[4] Germann, "Dreiundzwanzig Fälle von künstlicher Erregung der Frühgeburt nebst Bemerkungen darüber," *Monats. für Geburtsk.*, Bd. xii., S. 361.

[5] Gassner, *loc. cit.*, p. 17.

At the end of the 2nd month the uterus is the size of an orange.
3rd ,, ,, ,, the fœtal head.
4th ,, the fundus is at the level of the symphysis.
5th ,, ,, ,, half-way between symphysis and umbilicus.
6th ,, ,, ,, at the umbilicus.
7th ,, ,, ,, 3 finger-breadths over the umbilicus.
8th ,, ,, ,, half-way between the umbilicus and xiphoid.
9th ,, ,, ,, at the xiphoid.
10th ,, ,, ,, at the same level as at the 8th.

The above observations must be very inaccurate indeed, for the umbilicus lies in such variable situations that as a starting point for observation it is of little value. It varies according to Spiegelberg[1] from 5 to 11 inches from the pubes.

Further, the growth of the uterus is much more rapid at first, so that at the end of the fourth month the fundus is very distinctly above the symphysis; while the difference between the ninth and tenth months is often too slight to be of any value in fixing term. Pinard[2] remarks that he has never met with a case in which by the fifth month the fundus was not already at the level of the umbilicus; while at the fourth month he maintains the fundus rises over the symphysis from 13 to 17 cms.; and at the third month the fundus is already from 8 to 11 cms. above the brim. The height depends on:—

1. The state of the neighbouring organs.
2. The shape of the pelvis (in contracted pelvis the uterus having less room rises earlier).
3. The influence of corsets.

In very tall women the fundus may fail to reach the xiphoid at all.

The determination of the age of the pregnancy from the measurement of the height of the fundus is therefore somewhat of a guess; and this is especially so in the case of patients who are very much above, or very much under, the normal stature.

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[1] Spiegelberg, *loc. cit.*, p. 23.

[2] Pinard, *loc. cit.*, p. 4.

Though of less importance, the position of the uterus may be noted during its growth out of the pelvis.

In deformed pelves the normal amount of anteversion becomes exaggerated, and the gravid uterus may indeed be anteflexed. In some multiparæ with normal pelves (as instanced in a case on page 63) the uterus becomes anteflexed, due to the relaxation of the anterior support (subinvolution of the abdominal walls). The same results take place in large ventral herniæ as reported by Sperling.[1]

Retro-displacements cannot take place when the uterus is abdominal, *i.e.*, after the third month.

During the earlier stage of gestation, lateral flexions of the uterus (if extreme) may indicate extra-uterine pregnancy, inflammatory disease of one set of adnexa, etc., or be caused by tumours displacing the uterus. A certain amount of this displacement is so frequently present that it may be looked upon as normal. It is accompanied by a rotation of the uterus in its vertical axis. These positions of the uterus at the onset of labour are treated of elsewhere (see p. 28); so also are the positions of the uterus during the puerperium (see pp. 194-210).

The consistence of the uterus changes during the course of gestation. Not only does the uterus become tenser, but painless contractions occur as gestation advances. During the first half of pregnancy painless contractions are extremely rare; when present, they presage abortion. At that period the uterus forms a soft, non-fluctuant mass in the lower part of the abdomen; it is less tense than an ovarian cyst and less hard than a myoma, except on the occurrence of abortion, when, according to Pinard,[2] the uterus becomes like wood. During the early months of gestation, softening of the uterine muscle takes place along with the increase in size. This is only to be expected, for the rapid growth of the newly formed muscle cells and the increase in the vascularity, must of necessity lead to a lessening of the density of the uterus.

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[1] Sperling, "Ueber Hernia Uteri gravidi," *Archiv für Gynäkologie*, Bd. xxxvii., S. 308.

[2] Pinard, *loc. cit.*, p. 4.

About the third to the fourth month the fundus may be so soft that it can only be felt (even bimanually) with difficulty. One of the probable signs of pregnancy is a hardening of the uterine muscle, which gives rise to what is termed a painless contraction. Such contractions of the uterus may be spontaneous or may be induced by mechanical stimuli. They may also be local or general.

In cases of threatened abortion such contractions of the uterus are occasionally painful. The harder the uterus becomes and the longer the spasm lasts, the more likely is the abortion to take place.

# CHAPTER VI.

## POSITION OF THE GRAVID UTERUS, ETC.[1]

Position of the Uterus towards Term: Cases Selected—Method of Recording—Ætiology, Critical Review of Theories—Latero-Flexion—Rotation—Abnormalities in—Percentages—in Primiparæ and Multiparæ—Diagram of Possible Positions—Details of Cases.

Changes in the Uterus during Labour: In Consistence—After Labour—Changes in Size—Views of Various Authorities—Changes in Shape—Necessity for Further Investigation.

## POSITION OF THE GRAVID UTERUS TOWARDS TERM.

WHILE palpating the abdomens of patients admitted to the Glasgow Maternity Hospital, the writer, during his residence there, noted in most cases the position of the gravid uterus—usually shortly after the onset of labour. For the purposes of this investigation, only those cases will be referred to where the presentation and position had been at the same time ascertained beyond doubt, and had subsequently been verified by vaginal examination, etc. (In unusual cases evidence confirming the diagnosis is adduced.)

1. *Methods.*—The position of the uterus was located by palpation of the round ligaments,[2] which hypertrophy with the enlarging uterus. They become specially recognisable

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[1] Formed the subject of a paper read before the Glasgow Obstetrical and Gynæcological Society; appearing in the *Glasgow Medical Journal*, 1899, with a *résumé* in the *Practitioner*, December, 1899.

[2] Schröder's *Geburtshülfe, loc. cit.*, p. 24; Litzmann, "Beiträge zur Physiologie der Schwangerschaft," *Arch. f. Gynäk.*, Bd. x., S. 409.

during the pains, for their muscular fibres, striped and unstriped, contract with those of the uterus.[1]

2. *Definitions and Ætiology.*—The uterus was noted as showing *flexion* to the right or left according as its long axis diverged to right or left of the middle line. Auvard,[2] in his exhaustive article on lateral obliquity of the gravid uterus, affirms that the obliquity, in almost all cases, is apparent only, and that this apparent obliquity is due to an exaggerated development of one side of the uterus—leaving the long axis in the middle line, but giving the appearance as if the long axis inclined to one or other side. He says that the right side usually develops more than the left, just as it happens that most people are right-handed, and that the uterus falls to the side which shows the greater development.

It seems, however, to be little explanation of the fact that the new longitudinal axis, which comes to be the virtual one, should lie to the right side, to affirm that that side develops more than the other. For all intents and purposes the newly developed longitudinal axis is the true longitudinal axis of the uterus. One would imagine, also, if one side grew more than the other, that the uterus would be curved over to the opposite side. Auvard's diagrams make his theory very plain, but the abdominal contents acting mechanically would act upon the newly shaped uterus as if its apparent axis were the real one. It is conceivable that excessive one-sided growth of an organ might make it fall towards the same side; but in the case of the uterus, whose walls at term range from $\frac{1}{6}$ to $\frac{1}{4}$ inch in thickness,[3] there is no reason why a bulge on one side should do anything more than displace the uterus a little towards the opposite side. There is no doubt that the gravid uterus shows anything but a correct mathematical figure; the gravid uterus will be often observed to be round at one cornu while angular at the other, the angular pole being occupied by the placenta. Such a uterus, however, would not be said to show lateral obliquity. The irregular uterus will take up the position in the abdomen where it finds most room, just as any other semi-detached and freely movable body would. Again, if one side of the uterus grew more than the other, one would expect to find considerable disproportion in the lengths of the round ligaments, but this does not exist.

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[1] Rainey, *Philosophical Transactions*, 1850.

[2] Auvard, *Travaux d'obstétrique*, Paris, 1889, t. iii.

[3] Lusk, *loc. cit.*, p. 20.

By the courtesy of Dr. Jardine, Physician to the Glasgow Maternity Hospital, the author lately had the opportunity of palpating the abdomen of a case of pregnancy at term, in the left horn of a double uterus. Owing to the extreme tenderness of the abdomen, little could be made out except the peculiar position and shape of the uterus. The gravid uterus formed a pyriform swelling with the apex directed towards the left hypochondriac region. In this very exceptional case the one-sided development was the cause of the abnormal position as well as of the abnormal shape of the uterus.

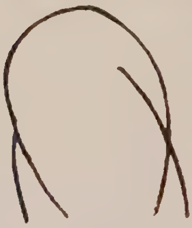

FIG. 2.

Rotation of the uterus was accepted if the origin of one or other round ligament indicated that the corresponding lateral aspect of the uterus was situated more anteriorly than normally. Diagrams were made after the above pattern (see fig. 2) which shows flexion and rotation to the right.

That the gravid uterus should lie asymmetrically is only to be expected when one recalls its relations to the vertebral column (with its anterior lumbar curve exaggerated into a lordosis) and its various attachments on its inferior aspect; but it is striking that the asymmetry should be preponderatingly in the direction indicated in the diagram.

Many reasons have been brought forward in support of as many theories to explain the phenomenon, such as that of Levret [1] who asserted that the uterus falls to the side of the placenta. In this he was supported by many of the older authorities. The site of the placenta has been shown by Murdoch Cameron [2] usually to lie to the side opposed to the abdomen of the child. Martin [3] held the same view. Cameron thinks the frequency of L.O.A. positions is due to the site of the placenta being usually located in the right superior part of the uterus. When the back comes to lie against the placenta there is some interference with the circulation, followed by a spasmodic movement of the child. Thus the back takes up a position opposite to the placenta by way of accommodation. To affirm, however, that because the placenta is usually right sided therefore the uterus falls to that side is about as absurd as to give the same *rôle* to the fœtal limbs. Paul Dubois [4] and Deleurye [5] thought that the latero-flexion might be caused by an habitual posture taken by the gravidum, and that the heavy uterus would fall towards the side on which the woman lay most frequently—usually the right.

Auvard,[6] in his researches on this subject, though admitting a certain *rôle* to decubitus, does not think that it plays an important part in the causation of lateral obliquity. Cazeaux and Tarnier found, in attempting to test the postural theory, that the woman's statements did not bear out the assertion of Dubois and Deleurye.

[1] Levret, *L'art des Accouchements*, 1761, t. i.

[2] Cameron, "A New Theory as to the Position of the Fœtus *in Utero*," *Brit. Med. Journ.*, vol. i., p. 525, 1896.

[3] Martin, "Zur geburtshülflichen Auskultation," *Monats. f. Geburts.*, Bd. vii., S. 170.

[4] Dubois (from Cazeaux and Tarnier), *Obstetrics*, English translation, 1885.

[5] Deleurye, *Des obstacles de la part de la mère qui rendent l'accouchement contre nature*, deuxième édition, 1777, p. 353.

[6] Auvard, *loc. cit.*, p. 29.

Madame Boivin[1] imagined right deviation to be due to shortening of the right round ligament. Pajot,[2] however, on measurement found that shortness of this ligament did not exist sufficiently to account for the flexion of the uterus. Cruveilhier,[3] on the other hand, supposed that any shortening of one round ligament to be found was the sequence and not the cause of the flexion of the uterus.

Desormeaux[4] and Playfair[5] mention that the lateral flexion is due to rectal distention, while Dubois thought that rectal would be compensated by cæcal pressure. The influence of rectal distention as an adequate cause of lateral displacement is taken exception to by Milne Murray,[6] because of the great number of cases where the uterus is not so displaced, although the rectum is almost always distended. In his paper he records a series of cases where, with occiput posterior presentations, flexion and rotation were present to the left; and he deduces from these facts that there is some relationship or association between flexion of the uterus and the posterior position of the fœtus. In the same paper Milne Murray seeks to show that uterine torsion or rotation is due to asymmetry in the muscular arrangements of the uterus, while he also says that the deviation or flexion is due to the torsion. It seems strange to assert that the anatomical irregularity of the uterine muscle should cause such a uniform deviation to the right in both transverse and longitudinal axes, unless the irregularity of the fibres is stereotyped, in which case the criticism applied by Milne Murray to Desormeaux and Playfair's theory might be applied to his own—*viz.*, that too many exceptions spoil the rule.

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[1] Boivin (from Cazeaux and Tarnier), *loc. cit.*, p. 31.

[2] Pajot (from Cazeaux and Tarnier), *ibid.*

[3] Cruveilhier (from Cazeaux and Tarnier), *ibid.*

[4] Desormeaux (from Cazeaux and Tarnier), *ibid.*

[5] Playfair, *Obstetrics*, 1876, vol. i.

[6] Murray, "On Deflection and Rotation of the Pregnant and Puerperal Uterus," *Edinburgh Medical Journal*, 1897, N.S., vol. i., p. 160; *British Medical Journal*, 1896, vol. ii., p. 1779.

Probably the uterine muscular arrangements are pretty uniform in their irregularities, and the obliquely running fibres during contraction would certainly rotate the uterus; but the rotation is not often enough in the one direction for this theory to be accepted. Again, how should presentation of the fœtus influence the anatomical characters of the uterus? Milne Murray's observations regarding the association of the deviation and occipito-posterior presentations refer, however, to the post-partum uterus.

Almost all observers are at one in stating that right flexion is the rule. Murphy[1] and Meigs,[2] however, state that lateral flexion usually exists to the left. Winkler[3] gives statistics showing right flexion to be commoner, while left torsion is more frequent than right. Dewees[4] and Playfair[5] affirm that rotation is normally to the right. Auvard[6] gives as his own the following figures:—

| | |
|---|---|
| Right obliquity, 55 per cent. | 33 per cent. primiparæ.<br>22 per cent. multiparæ. |
| Left obliquity, 5 per cent. | 2 per cent. primiparæ.<br>3 per cent. multiparæ. |
| In median line, 40 per cent. | 15 per cent. primiparæ.<br>25 per cent. multiparæ. |

He also gives the figures of Dubois and Pajot as:—

| | |
|---|---|
| Right obliquity . . . . . . . | 76 per cent. |
| Left obliquity . . . . . . . | 4 per cent. |
| In median line . . . . . . . | 20 per cent. |

---

[1] Murphy, *Lectures on Parturition*, p. 106.

[2] Meigs, *Obstetrics*, 1849, p. 204.

[3] Winkler, "Ueber die Stellungen des graviden und puerperalen Uterus," *Jen. Zeitsch. f. Med.*, Bd. iv., H. 3-4, S. 522.

[4] Dewees, *System of Midwifery*, Philadelphia, 1847, p. 103

[5] Playfair, *loc. cit.*, p. 32.

[6] Auvard, *loc. cit.*, p. 29.

Pfannkuch's[1] cases are divided as follows :—

| | |
|---|---|
| Right obliquity | 81 per cent. |
| Left obliquity | 6 per cent. |
| In the middle line | 7 per cent. |
| Both | 6 per cent. |

(3 of which were in contracted pelvis).

In the author's 35 cases there were :—

| | |
|---|---|
| Right obliquity, 32 per cent. | 73 per cent. primiparæ. |
| | 27 per cent. multiparæ. |
| Left obliquity, 8 per cent., primiparæ. | |
| In the median line, 60 per cent. | 52 per cent. primiparæ. |
| | 48 per cent. multiparæ. |

Auvard seems to think that the form of the uterus has a great influence on the position of the child, and his statistics bear out his assertions. He shows that the breech lies in the cornu, which, according to his theory, is most developed, *i.e.*, it lies towards the side to which the uterus is inclined.

Ahlfeld[2] states that the position of the child does not depend on the state of the uterus but *vice versâ*. Sutugin[3] does not agree with this. Pinard while discussing the shape and position of the uterus with reference to the presentation of the child denies that any relationship exists, and with this Winkler[4] agrees. The author's own cases do not show any apparent conformity between presentation or position of the child and position of the uterus.

Pinard, in the work referred to previously, mentions that lateral flexions of the uterus are more common in multiparæ than in primiparæ, while Auvard states the reverse. The writer's observations are seen in the following table :—

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[1] Pfannkuch, " Ueber den Einfluss der Nachbarorgane auf die Lage und Involution des puerperalen Uterus," *Archiv für Gynäkologie*, Bd. iii., S. 327.

[2] Ahlfeld, *loc. cit.*, p. 23.

[3] Sutugin, *loc. cit.*, p. 23.

[4] Winkler, *loc. cit.*, p. 33.

| | | |
|---|---|---|
| 35 cases. | 22 primiparæ. | Flexion, 11. |
| | | No flexion, 11. |
| | 13 multiparæ. | Flexion, 3. |
| | | No flexion, 10. |

Thus, in primiparæ 50 per cent. show flexion, while only 23 per cent. in multiparæ are latero-flexed. These cases are too few in number to be made the basis of a theory ; but it is only to be expected that where the intra-abdominal tension is greatest the displacement of the uterus to one or other side of the spine will be more evident.

The uniformity of right flexion associated with right rotation led the author to take notes of the cases as they presented themselves ; and after looking over the analysis of them there is evidently some association between flexion and rotation. It is hardly conceivable that the twisting or rotation of an organ should make it more prone to bend to the side, as Milne Murray seems to think.[1] Twisting any structure usually makes it more rigid. Looking at the cases of multiparæ, one sees that the uterus is more likely to be in the middle line if it shows rotation or torsion than is the case in primiparæ. Thus in multiparæ there were in the middle line 10 ; of these rotation was found in 6. In primiparæ there were in the middle line 11 ; and of these rotation was found in 4. Thus, when the multiparous uterus is stiffened by rotation, it is more likely to be found in the middle line than when it is not rotated. It is also true that an equal number of cases are found in the middle line associated with, as without, rotation ; those in the middle line without it are mostly primiparous uteri.

Rotation of the uterus, unaccompanied by latero-flexion, implies laxness of both round ligaments, while flexion would be produced by relative tightness of one, a condition which has been shown by Pajot not to exist. Rotation to the right could never be caused by tightness of the right round ligament, which would draw its corresponding cornu forwards, and so produce a left rotation. Guyon[1] thinks that the uterus is directed to the right, as are all freely movable tumours growing out of the pelvis, because of the anatomical attachment of the intestinal mesentery, which directs the growing mass towards the right.

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[1] Murray, *loc. cit.*, p. 32.

According to Winkler,[2] the cause of right flexion is purely a mechanical one, and Pinard agrees with him. Pfannkuch[3] notes that the expanding uterus must take the side of the abdomen where there is most room, and the more the lateral flexion the more must be the rotation; that is to say, when, on account of the obliquely backward curve of the abdominal wall, the fundus falls to one side, the corresponding cornu is pushed backwards while the other cornu comes forwards. The fundus therefore rotates round the spine as centre, and does not merely fall bodily to one or other side. Admitting, then, the almost normal position of the uterus to be towards the right side, then the left round ligament will be tightened and will draw forwards the left cornu, thus producing right rotation. In this way it would appear that flexion has more to do with rotation than *vice versâ*. All the cases here referred to showing flexion showed rotation as well, except those which were complicated with contracted pelvis. Rotation of the uterus, which exists in many cases alone, is a method of accommodation of the uterus in the abdominal cavity with regard to the spine. It can only exist where both round ligaments are relaxed.

Ferguson[4] in his paper states that rotation is due to muscular action, that it is increased at term and during labour. He thinks that it is influenced by the position of the fœtus. In this he agrees with Schröder and Schatz, while he states that Lusk, Spiegelberg and G. Martin do not think that the position of the fœtus influences rotation of the uterus.

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[1] Guyon, "Sur la cause de l'inclinaison de l'utérus à droite pendant la grossesse," *Archives de Physiologie normale et Pathologique*, 1870, t. iii., p. 75.

[2] Winkler, *loc. cit.*, p. 33.

[3] Pfannkuch, *loc. cit.*, p. 34.

[4] Ferguson, "Uterine Rotation: Its Clinical Importance in Pregnancy and Labour," *Transactions of the Edinburgh Obstetrical Society*, vol. xviii., p. 110.

The following diagrams indicate better than a table the various possible uterine positions with regard to latero-flexions and rotations :—

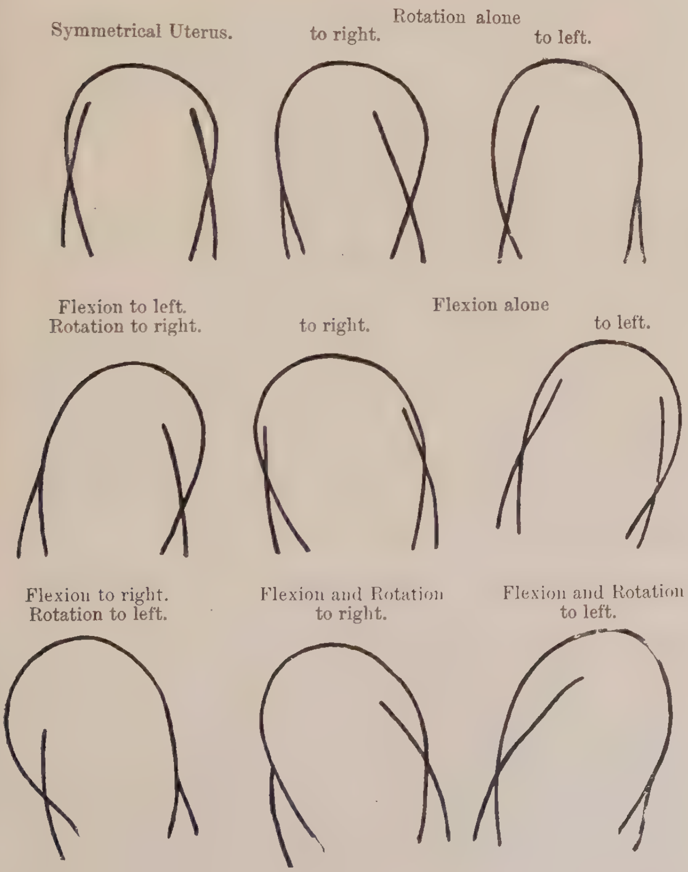

FIG. 3.

The following is the list of the cases in detail :—

I. *Primiparæ*—

1. Left flexion, no rotation, contracted pelvis, presentation R.O.A. ; Cæsarean section.

2. Left flexion, right rotation, presentation L.O.A.

3. Symmetrical, presentation L.O.A.

4. Middle line, rotation to the left, presentation R.O.A.

5. Right flexion and rotation, presentation R.O.P. (per vaginam, anterior parietal bone overlapping posterior, found post-partum to be the left parietal overlapping right, other vaginal signs of occipito-posterior presentation ; fœtal heart sounds heard best in right lower umbilical region).

6. Middle line, right rotation, presentation L.O.A.

7. (This case is omitted from the statistics.) Uterus symmetrical, presentation R.O.A. Two days later, right rotation, fœtal limbs posterior ; later on same day, marked rotation to the left, right ovary at umbilicus.

8. Symmetrical, presentation L.O.A.

9. Right flexion and rotation, presentation R.O.P., contracted pelvis (forceps after engagement, rotation with forceps on ; mark of left blade over right eye and forehead of child).

10. Right flexion and rotation (extreme), presentation R.O.P. (vaginal and palpation signs, forceps, persisted as occipito-posterior).

11. Right flexion and rotation, presentation L.O.A.

12. Median line, marked right rotation, presentation L.O.A.

13. Symmetrical, presentation R.O.A.

14. Left flexion, no rotation, presentation L.O.A. (contracted pelvis, craniotomy).

15. Right flexion (extreme) and rotation, presentation L.O.A.

16, 17, 18, 19. Symmetrical, presentation L.O.A.

20. Median line, extreme right rotation, presentation L.O.A.

21, 22. Right flexion and rotation, presentation L.O.A.

23. Right flexion (extreme) and rotation, presentation R.O.A. (forceps).

II. *Multiparæ*—

24. Right flexion and rotation, presentation L.O.A.

25. Median line, right rotation; twins: first in R.O.P. (palpation and vaginal signs), second in fourth breech.

26. Symmetrical, presentation R.O.P. (palpation and vaginal signs, fœtal heart sounds best heard in right umbilical region, child small, occipito-posterior position persisted, caput on anterior superior angle of left parietal bone).

27. Symmetrical, presentation L.O.P. (palpation and vaginal signs, fœtal heart sound best heard to the left; restitution to the right, spontaneous rotation).

28. Median line, rotation to the left (extreme), presentation R.O.P. (palpation and vaginal signs, fœtal heart sounds best heard to the right, contracted pelvis, forceps, rotation with forceps on).

29. Right flexion and rotation, presentation L.O.A.

30. Median line, left rotation, presentation L.O.A.

31. Right flexion and rotation, presentation L.O.A.

32. Symmetrical, presentation R.O.A.

33. Median line, left rotation, presentation L.O.A.

34. Median line, right rotation, presentation R.O.A.; contracted pelvis, engagement in the transverse diameter, occiput to the right.

35. Symmetrical, presentation L.O.A.

36. Median line, slight left rotation, presentation R.O.P. (forceps later on at outlet, then presentation R.O.A.).

Finally, the following conclusions may be drawn:—

1. Right flexion with right rotation is by far the commonest deviation. No case of the converse was met with.

2. Flexion is caused by purely mechanical conditions, and it will tend to produce rotation to the same side.

3. Flexion has no relationship with presentation or position of the fœtus.

4. Rotation is due to laxness of the uterine ligaments, and possibly to an irregular contraction, but not to an irregular arrangement of the muscular fibres. It may replace lateroflexion as an attempt at accommodation. One case (No. 7) showed in the space of three days, first, symmetry, then rotation to the right, and finally rotation to the left.

5. Only two cases of flexion without rotation occurred, and these were complicated by contracted pelvis (Nos. 1 and 14).

6. An absolutely symmetrically placed uterus is more common in primiparæ; but one medianly placed, if accompanied by rotation, is commoner in multiparæ.

Since writing the foregoing paper, further consideration of the subject and increased experience has not led the author to adopt different views or necessitated revision of the conclusions then arrived at.

## CHANGES IN THE UTERUS DURING LABOUR.

1. Painless contractions of the uterus are much more frequent in multiparæ, and they occur more commonly towards the end of gestation. The more readily they can be brought on by manipulation the greater is the probability of an early onset of labour.

During labour the degree of hardness varies greatly in different cases. Towards the end of labour when the fundus has reached its maximum thickness the hardness of the uterus is most marked.

Immediately after labour the uterus becomes like wood, especially the pluriparous uterus. In the puerperium the hardness of the womb depends very much on its state of contraction, and this has a marked bearing on the process of involution.

Under the influence of ergot, particularly when administered hypodermically, the fundus of the uterus may be noticed to become tonically contracted.

With the application of the hot douche the fundus, and, indeed, the whole organ, passes into a spasmodic condition.

Mechanical irritation, both before, during and after labour, acts most efficiently in causing contraction.

2. The changes in the size of the uterus.

During a pain it is generally recognised that the gravid uterus rises and projects forwards. According to Litzmann[1] the fundus rises a finger's breadth. Lüdecke,[2] in his dissertation, gives the heights as 27·3 cms. during the pains, and 25·4 cms. during the pauses; even in abnormalities of shape in the uterus and in contracted pelves the fundus rose during the pains.

When we come to the estimation of the height of the uterus after the head is born then there is some difference in opinion. Fothergill[3] says that the fundus does not sink before the birth of the head; in one case he found the fundus 2 inches higher at the end of the first stage than during it; in another the fundus was 3 inches lower at the end of the second stage than during the first. His averages are:—

Before birth the fundus rises ·3 inch, and narrows 1·1 inches.

Litzmann affirms that the fundus remains at the same level till the head is born, after which it begins to fall. Lüdecke writes that: "The fundus remains at the same level till the head appears at the vulva, the increase in length being due to extension of the child. During the birth of the head, and due to abdominal pressure, the fundus falls, measuring during the pains 23·1 cms., and between, 25·3 cms." This, he says, is contrary to what Hoffheinz[1] states, *viz.*, that the fundus rises from 1 to 2 cms. during the birth. The figures given by Lüdecke are :—

---

[1] Litzmann, *loc. cit.*, p. 28.

[2] Lüdecke, *Der Höhenstand des Fundus Uteri in der Austreibungs- und Nachgeburtsperiode*, Inaugural Dissertation, Würzburg, 1889.

[3] Fothergill, "A Clinical Note on the Height of the Fundus Uteri during the First Stage of Labour and at the End of the Second Stage," *Transactions of the Edinburgh Obstetrical Society*, vol. xx., p. 113.

| | |
|---|---|
| 1. Head in the pelvis (*a*) during the pains | 27·3 cms. |
| ,, ,, (*b*) ,, ,, intervals | 25·4 ,, |
| 2. Head at the outlet | the same as above. |
| 3. Head being born (*a*) during the pains | 23·1 cms. |
| ,, ,, (*b*) ,, ,, pause | 25·3 ,, |
| 4. Head born | 22·2 ,, |
| 5. End of the second stage | 15·2 ,, |

Sutugin[2] states that when the uterus contracts the fundus rises 1 cm., and during labour from ·5 to 4 cms.

3. Changes in the shape of the uterus during labour.

Any increase of tension in an elastic organ tends to induce that organ to become more spherical if that be possible. During the pains, therefore, the uterus tends to become more spherical, its antero-posterior diameter being increased at the expense of the transverse. As the uterus is lengthened during the pains the principle that the organ becomes more globular can only refer to its transverse plane, and it may, therefore, be said that the longitudinal, as well as the antero-posterior diameters, increase at the expense of the transverse. If this be so then it follows that the transverse fibres are more powerful than the longitudinal, and that the fundus is not virtually a rigid structure, against which the expellent forces can have no effect, and the uterus, instead of contracting as a whole, contracts principally in its middle, thus tending to assume the hour-glass shape.

The expellent forces would be thus divided between lengthening the uterus, *i.e.*, expanding and pushing up the fundus, and in extruding the head. It seems to me that either this deduction, based on the consideration of the measurements, or the measure-

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[1] Hoffheinz, "Der Höhenstand des Fundus Uteri bei der Geburt," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1888, Bd. xv., S. 433.

[2] Sutugin, *loc. cit.*, p. 23.

ments themselves, must be incorrect; for there can be no doubt that the muscle at the fundus is certainly as strong as that of the body, and probably much stronger. It would be a very faulty mechanism which would allow the one part of the uterus to be stretched by the contraction of another. For this reason it is more likely that the contracting organ does not lengthen, and that when the pain is at its height the apparent rise of the fundus is due to its projection forwards. The depression in the posterior uterine surface caused by the spine becomes less; so that a greater area of the top of the uterus gets pressed against the anterior parietes; besides, the whole body of the uterus may rise above the fœtus at the expense of part of the lower uterine segment. If, indeed, any virtual rise takes place then it is due to a possible stretching of the utero-vaginal junction, when the contracting organ, meeting an obstruction, attempts to rise over it. The same sort of mechanism probably comes into play during the expulsion of the placenta.

The change in position of the contracting uterus will counterbalance the diminution in the intra-abdominal tension, as the viscus assumes a more globular form, which occupies less space in the abdomen.

The whole subject is one of much interest and requires further observation and investigation.

# CHAPTER VII.

## ATTITUDE OF THE CHILD.

Theories of the Cause -Changes in—Relations—Abnormalities in—Various Parts.

THE attitude of the fœtus is, as a rule, one of general flexion; the various movable parts of the fœtus being tucked away, so that the total bulk of the child is reduced to a minimum: the attitude is thus one of accommodation. Why the head should present in the majority of cases has given rise to much discussion, and various views are held upon the subject. The various theories may be classified as follows:—

1. The Aristotelian or gravitation theory has found many supporters, among whom are Matthews Duncan[1] and Veit.[2]

2. The instinctive or voluntary movements theory, promulgated by Dubois.[3]

This theory was modified by Simpson,[4] who agreed with Dubois that the attitude and presentation were due to fœtal movements, which were of reflex rather than of an instinctive nature. Meeh[5] strongly supports the view that the presentation, etc., is due to the movements of the fœtal limbs, which tend to take up the position where the uterine walls are most yielding. Cohnstein[1] brings out the fact that with death of the fœtus the normal position usually taken by the child is lost.

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[1] Duncan, *Researches in Obstetrics*, p. 14.

[2] Veit, *Scanzoni's Beiträge*, Bd. iv., S. 47 (from Lusk).

[3] Dubois, "Mémoire sur la cause des présentations de la tête," *Mém. de l'Acad. Roy. de Méd.*, t. ii., p. 265, 1833 (from Lusk).

[4] Simpson, "On the Attitude and Positions, Natural and Preternatural, of the Fœtus *in Utero*," *Obstetric Works*, edited by Priestley and Storer, vol. ii., p. 81 *et seq.*

[5] Meeh, "Warum kommt das Kind am häufigsten in der Kopfendlage zur Welt?" *Arch. f. Gynäk.*, Bd. xx., S. 185.

3. The theory, held by Credé, Kristeller[2] and Hicks, which attributes the presentation to uterine contraction.

The attitude taken up by the fœtus is one which is constantly changing; this taking place with more frequency during the earlier months of gestation, and in cases where there is an excess of liquor. Valenta[3] puts the percentages of cases which change at 42·4, and he remarks that a male fœtus changes oftener than a female.

In multiple pregnancy the position taken up by the different fœtuses illustrates very well the principle of accommodation. As a rule, both heads occupy the lower segment.

In the lower animals the same rule evidently holds good, irrespective of action of gravity. In them it is usual for the head to present, and the head is not at the lowest part of the uterus.

The head usually forms the inferior pole of the fœtal ovoid. It is more or less flexed, with the chin towards the sternum, over which are folded the arms. As engagement begins the flexion increases, and in small pelves it becomes extreme. In the flat pelvis extension of the head is one of the steps in the mechanism of delivery. If there is no bi-parietal obliquity of the head in reference to the brim, then there must be a lateral flexion of the head with reference to the child's trunk, so that one ear inclines towards the corresponding shoulder. There can be no doubt that the head does not hang square from the shoulders; there is some turning of the head towards one shoulder, usually the posterior.

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[1] Cohnstein, "Die Aetiologie der normalen Kindeslage," *Monatsschrift für Geburtskunde*, Bd. xxxi., S. 141.

[2] Schröder, *loc. cit.*, p. 24.

[3] Valenta, "Geburtshülfliche Studien," *Monatsschrift für Geburtskunde*, Bd. xxv., S. 202.

When the natural flexion of the head gives place to extension, the presentation becomes a brow or a facial, according to the amount of extension present. This divergence from the normal may be produced by a variety of causes. These have been enumerated in a paper by Matthews Duncan and Hurry.[1]

These factors act either directly on the head or through the agency of the trunk. They are:—

1. Tumours of the fœtal neck.
2. Tonic contraction of the neck muscles (Halliday Croom).
3. Malformations of the head.
4. Distention of the fœtal bladder.
5. The cord pulling the limbs back (Horder's case).
6. Amniotic bands (Duncan).
7. Extension, with extrusion of viscera.
8. Backward displacement of the arms (case reported by Milne Murray).

With regard to the position of the limbs, it may be generally affirmed that they take up a position of flexion, accompanied by outward rotation and abduction, so that when the legs are crossed the foot of the one leg lies on or near the thigh of the other. In first positions it is the left foot which lies in the right cornu, and as a rule only one foot can be palpated, unless the back is laterally or posteriorly situated. In back posterior positions there are so many small fœtal parts that their identification is often difficult. In these cases also the frequent anterior attachment of the placenta masks the outlines of the various limbs: not in every case of back posterior is the placenta placed anteriorly, but in such as it is palpation is often rendered futile.

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[1] Duncan and Hurry, "On Extensions or Retroflexions of the Fœtus, Especially of the Trunk, during Pregnancy," *Transactions of the London Obstetrical Society*, vol. xxvi., p. 206.

Only occasionally are the legs extended, and these cases are usually breech presentations.

The limbs are easily moved, and the direction of the movements may indicate the particular extremity.

The arms are less constantly flexed than the inferior extremities. Complete extension of the arms is, however, rare; for they are less powerful, and they have less room in which to move. They are more difficult to palpate on account of the readiness with which they elude a grasp. The possibility of palpating the chin depends on the passivity of the superior extremities.

The trunk follows the same inclination as the other fœtal parts, *viz.*, one of flexion. It is usually found lying to one or other side of the maternal spine, and in the weeks previous to term it is often placed more posteriorly than anteriorly. This position of the back corresponds with the (pre-labour) transverse position of the vertex.

A general extension of the trunk is brought about by the same means as cause the extension of the head; and this is either primary or secondary to the extension of the neck. In these anomalous conditions, the fœtal heart sounds are occasionally distinctly heard on the side of the limbs.

The funis can, in a few cases, be palpated as it lies over the back of the infant, or as it is wound over or round the neck.

Before the maximum utility can be gained from palpation, it is necessary that the attitude of the child should be more or less definitely mapped out.

# CHAPTER VIII.

## METHODS.

Pinard's: Preliminaries—Pelvis First Examined—Three Possibilities—Pelvis Occupied, Head Presentation—Pelvis only Partly Full, Breech Presentation—Pelvis Empty, Transverse Presentation. Leopold's: First Grip to Fundus—Second to Body of Uterus—Third to Lower Uterine Segment—Fourth into Pelvis when Head Sunk into It. Author's: A Mixed Method—Preliminary According to Leopold, and for Diagnosis of Presentation and Position According to Pinard—Diagram for Recording Points Observed.

A DIFFERENCE of opinion exists regarding the best method of procedure to be adopted in palpation of the abdomen.

Pinard, in his exhaustive treatise on this subject, recommends the practitioner to begin his examination at the lower uterine segment. Müllerheim[1] agrees with this; while Leopold has methodised the procedure into four stages; the first application of the hands being to the fundus. Leopold's method is that which is followed in the Rotunda Hospital, Dublin. There can be no doubt that to begin with the examination of the lower uterine segment gives a much more satisfactory understanding of the case, and saves time.

The various text-books devote only a small part of their contents to the external examination in pregnancy and during labour; this is especially so in English works. In Dakin's[2] *Treatise on Midwifery* the subject is somewhat more detailed; but even this author, who says "the importance of abdominal examination as a means of diagnosis can hardly be overestimated," affirms, without qualifications, that vaginal examination is absolutely necessary for the purpose of recognising presentation of the cord. In the *Encyclopædia Medica*[1] a method of abdominal palpation is outlined which follows the indications given by Leopold.

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[1] Müllerheim, *loc. cit.*, p. 3.

[2] Dakin, *Handbook of Midwifery*, 1897.

The omission from our text-books of any serious study of this subject has been remarked upon by Warden[2] in the paper referred to. It is to American, French and German workers that we are almost wholly indebted for any advance which has been made in this department of medicine in recent years.

*Pinard's Method.*—Pinard recommends the following preliminaries :—

The woman should be in bed, with the abdomen bared from xiphoid to pubes. Her decubitus should be as horizontal as possible ; the head not being supported by more than one pillow. The arms are to be placed alongside the trunk. Flexion of the thighs and legs is not advantageous ; *firstly*, because it interferes with deep exploration of the pelvis ; *secondly*, because it does not allow of proper examination of the pelvic rami ; and *thirdly*, because the abdominal muscles seem to contract more readily when fully relaxed. The fully extended legs should be slightly abducted. The hands of the investigator must be warm.

If, on placing the hands on the gravid abdomen, contractions (painless or of labour) take place, then the examination, conducted during the intervals between the pains, will be fruitful. The examiner may place himself on either side of the patient, opposite the region of the umbilicus with his back to the patient's face.

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[1] *Encyclopædia Medica*, 1900, vol. vi.

[2] Warden, *loc. cit.*, p. 5.

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1. *The* feature of Pinard's technique is, that as the head ought to be in the region of the pelvis, then it is right to begin the investigation by seeking for it there.

The pubes and the pubic rami are to be carefully mapped out, as by this means alone can the degree of engagement be estimated and the bones of the pelvis differentiated from those of the fœtus. By means of the extremities of the fingers it is usually easy to feel the edge of the anterior superior border of the pelvis (see fig. 4).

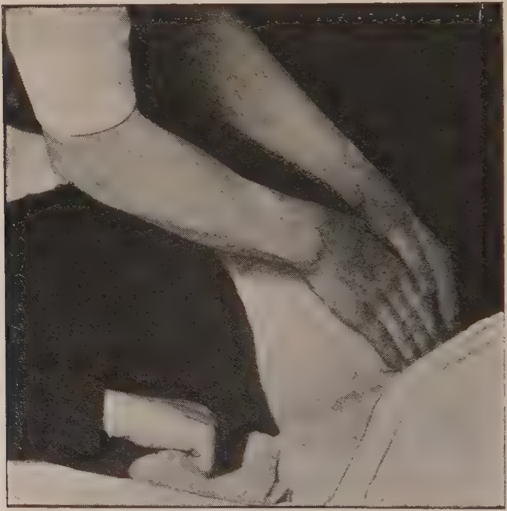

FIG. 4.

2. On pressing the abdominal walls from above downwards and from before backwards :—

(1) The finger-tips receive a sensation of resistance from a large round body, which is hard and prevents further downward penetration and which fills the pelvis (see fig. 5).

(2) Or the fingers may force their way into the small pelvis

and there feel on their palmar surfaces a more or less irregular and resistant mass (see fig. 6).

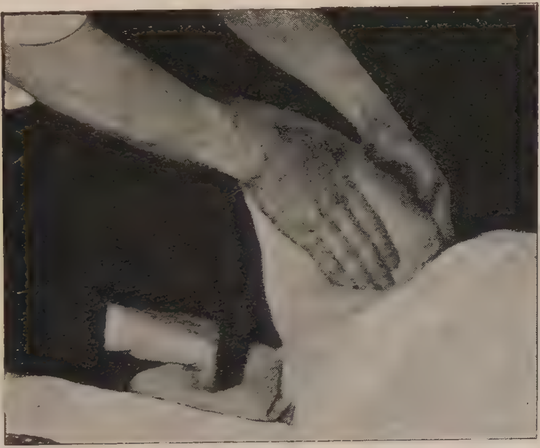

FIG. 5.

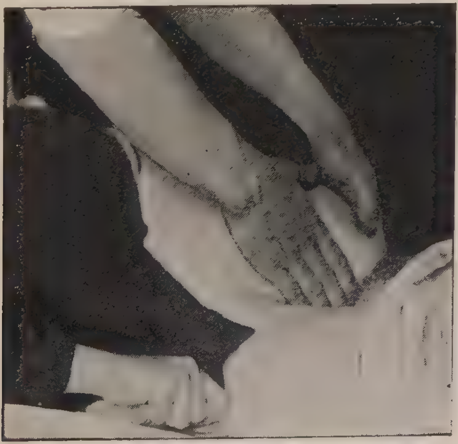

FIG. 6.

(3) Or a feeling of resistance is furnished by the soft parts only; the hands being capable of approximation medianly (see

fig. 7). (This sign is also present in cases of contracted pelvis where the head lies over the brim.)

Thus the three varieties :—

(1) Pelvic cavity occupied by the head,
(2) Pelvic cavity covered by the breech, and
(3) The pelvic cavity free,

cover about all the various conditions found during palpation.

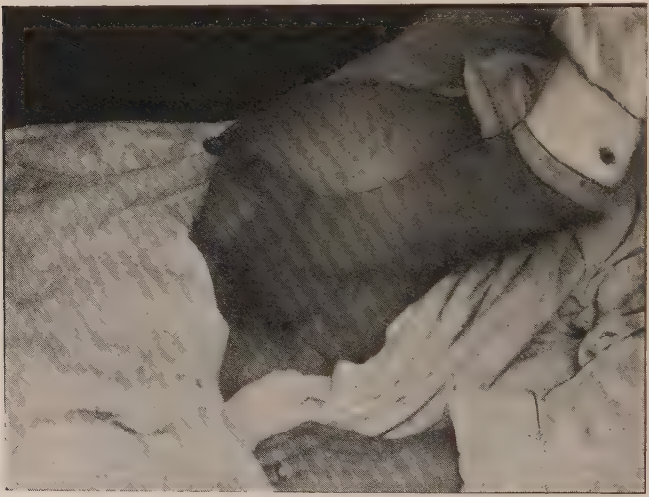

Fig. 7.

(1) *Pelvic Cavity Full.*—The body felt filling it is round, regular, resistant, and is either in part or whole descended into the pelvis. These characters belong to the cephalic extremity only.

During pregnancy, or before the onset of labour, this could only be the vertex ; for neither the face nor the trunk are, according to Pinard, ever met with in the pelvic cavity. Strong and frequent pains are necessary before the breech can engage, and these are only present during labour. To find in a pregnant woman the pelvis filled by a regular, rounded, hard tumour, means that the presentation is a vertex one, and that the presentation is permanent and fixed. (The exception to this will be referred to later on, see p. 81. Change of position can of course take place.

When the vertex is engaged, one side of the sphere is usually more accessible, or more evident than the other (see fig. 5, and p. 50). The part which is more descended is the occiput. It is therefore possible to diagnose position as well as presentation.

(2) *Incomplete Occupation of the Pelvis.* Besides the incomplete occupation of the pelvic cavity, there is the want of uniformity in the body covering or partly occupying it, and neither side is more palpable than the other.

At the outset, then, it can be said that the presentation is longitudinal, and further examination of the uterus will reveal the details.

(3) *Empty Pelvis.* -The pole of the fœtus which should be occupying the brim may be felt in either iliac fossa; for a symmetrical transverse is uncommon.

3. The examination for the other pole of the fœtus (usually at the fundus).

(1) In vertex presentations the fundus is occupied by a voluminous, irregular body, with less uniform consistence than is possessed by the head. It is accompanied by the small fœtal parts. The breech usually lies towards the right side of the fundus. When the back is entirely anterior, the limbs may be obscured.

Further evidence, if required, is elicited by examination of the back. The back is a smooth resistant body uniting the two poles. It may be separated by liquor amnii or placenta from the abdominal wall. In posterior positions it will be situated more or less laterally, and the difference of resistance on either side must be estimated to allow of a comparison being made between the resistance of the back and that of the liquor amnii or placenta.

(2) In breech presentations the head occupies the fundus, usually towards the right cornu, occasionally medianly, or in the left cornu. The characteristic groove of the neck allows of a certain diagnosis being arrived at. The movement of the head, apart from the trunk (ballottement), also differentiates the head from the breech.

In the foregoing account of Pinard's method the question of the diagnosis of the various positions of the head has not been touched upon in detail, but the method only has been outlined.

*Leopold's Method.*—This method,[1] on the other hand, differs much from Pinard's, and its author recommends what Pinard disapproves of, *viz.*, the examiner to begin with the fundus and extend his exploration downwards; and from the facts so gained, by a cumulative process as it were, to arrive at a diagnosis. This is the method described by Mundé,[2] and is similar to that taught in the Rotunda Hospital in 1897. In the works of Leopold referred to, the technique is as follows:—

The abdomen is bared and the warm hands are gently, though firmly applied. The size and tenseness of the abdomen, the size, form, fixity or mobility of the uterus and the quantity of the liquor amnii are estimated. By a gentle to-and-fro movement and pressure of both hands, or by a continuous digging, the various parts of the ovum with its size, position, movements and mobility are ascertained. The method is then described under four stages.

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[1] Leopold und Spörlin, *loc. cit.*, p. 2; Leopold und Zweifel, *Lehrbuch für Hebammen*, Leipzig, 1897; Leopold und Pantzer, *loc. cit.*, p. 3; Leopold und Orb, *loc. cit.*, p. 2; Credé and Leopold, *loc. cit.*, p. 4; Leopold, "Ueber die äussere Untersuchung in der Geburtshülfe," *Münchener Medicinische Wochenschrift*, 1897, No. 40.

[2] Mundé, *loc. cit.*, p. 4.

1. *First Grip.*—Both hands, with finger-tips together, are placed transversely on the abdomen (see fig. 8), and by manipulation the position of the fundus is settled. Also by this means one is able to say if the presentation be longitudinal or transverse; whether the head or the breech is occupying the fundus; what size the child is, and how far advanced is the pregnancy.

2. *Second Grip.*—Both hands are slipped along the abdominal wall till they become laterally placed (see fig. 9). Under one hand the fœtal small parts are to be felt and under the other the back of the fœtus. By pressing away from the middle line the back is displaced towards one flank, and can be easily felt bimanually.

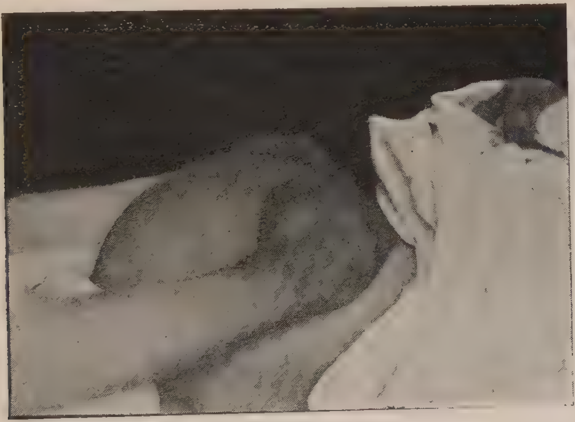

FIG. 8.

3. *Third Grip.*—The parts entering into the pelvis are enclosed between the middle finger on one side and the thumb on the other (see fig. 10). Should the fœtal part so grasped by the fingers be hard and round, then it can only be the head; and when it has not engaged it is movable from side to side. The breech is much softer and more uneven. Should one feel these fœtal parts

excessively muffled, more indistinct and softer than usual, then the placenta is presumed to occupy the lower uterine segment. Should one feel no fœtal parts, then the head is sought for in either flank. The next grip will come into play should the head be sunk into the pelvis.

4. *Fourth Grip.*—The tips of the fingers, placed together, are sunk into the pelvis in much the same way as is shown in diagram 6 (see p. 51), which also represents the position of the hands when the pelvic cavity is only partly filled by the breech.

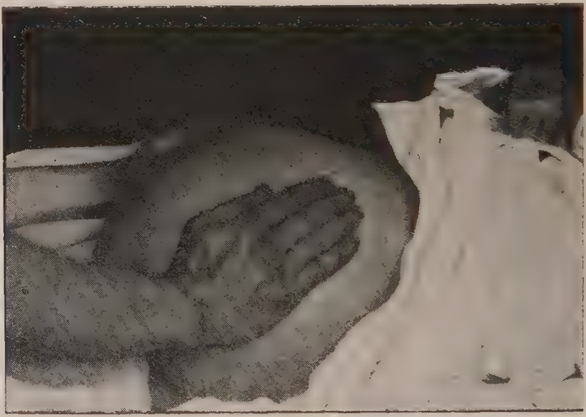

Fig. 9.

Thus the fourth grip of Leopold is much the same as that recommended by Pinard for the investigation of the pelvic cavity; instead of the hands finding their way equally well on both sides (as they do in breech cases), one sinks more deeply (when the head is descended), for the occiput will be on that side which permits the deepest descent of the fingers, while the brow or chin will occupy the other. The two conditions—head deeply sunk and pelvic presentation—on account of giving so far the same sign, must not be mistaken.

From comparison of these two methods, one sees that the latter (Leopold's) is much the same as the former (Pinard's), only taken in the reverse order; yet this constitutes a marked difference in the general plan.

There can be no doubt that the application of a little system and order prevents the impressions received during such abdominal palpation from becoming confused. For this reason the method of Pinard seems the better. Here the examiner proceeds to seek for the head in its normal site, *viz.*, in the lower uterine segment.

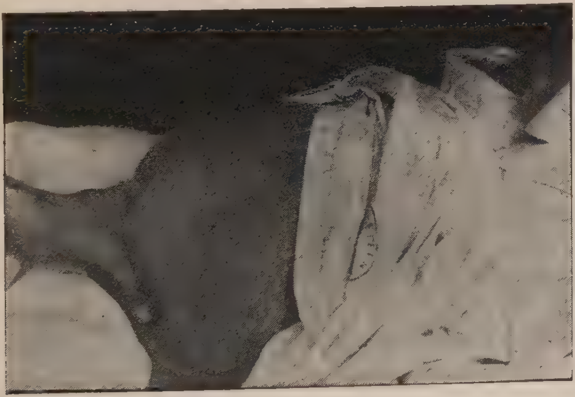

FIG. 10.

The method employed by the author is usually the following:—

The abdomen is bared from the xiphoid to the pubes, during which process anything noteworthy may be observed. The woman should be in an even dorsal position, with low head and extended legs. With warmed hands the following points are searched for by palpation:—

1. The general position of the uterus.
2. The correspondence between subjective pains and uterine contractions.
3. The round ligaments, especially during the pains.

4. The appendages.
5. The quantity of the liquor amnii.
6. The state of the bladder.
7. The seat of the placenta.
8. The location and size of the head; and as a result the diagnosis of the presentation, the degree of fixity and descent of the presenting part.
9. The attitude, size and movements of the child.

By auscultation the rate and seat of maximum intensity of the fœtal heart sounds are noted (F. H. S.).

The examination is begun by palpating the fundus superficially, merely to find the position of the uterus, round ligaments and appendages; by this preliminary manœuvre the patient becomes accustomed to what is usually the novelty of the procedure. The amount of the liquor amnii is estimated and the placenta located. Then the head is sought for at the brim, by the third grip of Leopold (see fig. 10, p. 57); sometimes designated the grip of Pawlik.[1] Ahlfeld[2] thinks the fourth grip more useful than Pawlik's (see fig. 5, p. 51). In the large majority of cases this gives the information that the head is under observation. At the same time the degree of fulness of the bladder is made out. By thus combining Leopold's with Pinard's manipulations, the details regarding the head, its state of flexion, fixity, descent and position are brought out, and the chin or brow, and the neck or occiput identified. The handling necessary to ascertain these latter facts is sometimes irksome to the patient. Finally the back and other fœtal parts are searched for by all kinds of movements; without any discomfort necessarily accruing to the mother. Often a gentle thrust administered to the child, after pressing away the superimposed liquor, elicits from it a movement of protest more or less energetic and sufficient to indicate the position of the limbs. The general size of the child is to be specially observed as an important factor in the prognosis of the case. In many cases the exact size of a foot may be noted, and may indicate the probable size of the child to which it belongs.

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[1] Jellet, *A Short Textbook of Midwifery*, 1899.

[2] Ahlfeld, *loc. cit.*, p. 4.

After a thorough palpation and auscultation the examiner should have gained all the information required; but if there is any point on which he is still uncertain, let him make a vaginal examination to supplement the information gained from palpation and auscultation. This will give him the feeling of confidence which follows a thorough comprehension of a case. For purposes of registration, a rough diagram after the foregoing pattern (see fig. 11) is useful; it is more quickly made than the facts it portrays can be described.

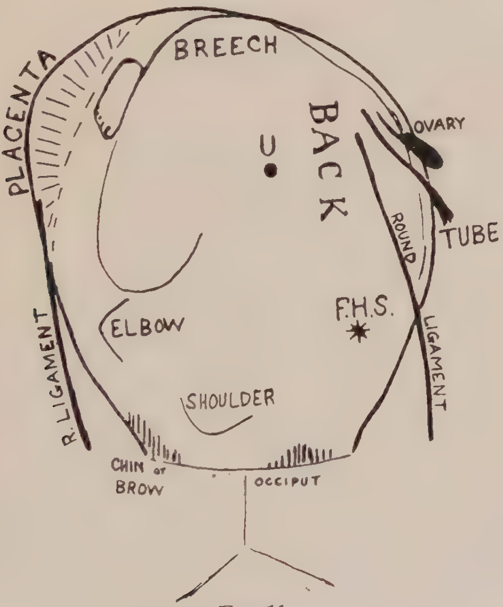

Fig. 11.

# CHAPTER IX.

## IN THE MANAGEMENT OF LABOUR.

Utility of Palpation—Indications—Application—Order.

That the so-called physiological act of labour requires management at all, is due to the fact that the physiological may be quickly changed into the pathological. Thus it is that even such a natural function as parturition requires at least observation and careful attention from the medical attendant so as to forestall difficulties and make treatment more prophylactic than symptomatic.

How then can information be gained which will enable the accoucheur to dismiss from his own mind, and that of his patient, all prospects of impending trouble?

By a thorough examination of the abdomen during the later months of pregnancy, and at the onset of labour, information may be elicited of such a character as to enable one to say that the case under observation is going to belong to the normal class of deliveries. On the other hand, certain facts may be noted which awaken the suspicion that divergencies from the normal exist, or may be expected.

How much more smoothly runs the course of labour, and especially of the puerperium, if there has been time to employ the requisite antiseptic and aseptic precautions, and if by a little forethought preparations have been made for the treatment of any of the following conditions, which may be diagnosed before, or at the onset of labour:—

1. Breech or transverse, etc., presentations.
2. Contracted pelvis.
3. Multiple pregnancy.
4. Hydramnios, etc.[1]

What information regarding any of these can be got from a vaginal examination before labour begins? And yet how much benefit there is in knowing beforehand that any one of these conditions is present.

A contracted pelvis will escape notice on vaginal examination, unless it is specially looked for, or unless it is present in an extreme form (see p. 2).

In 1886 in an editorial article in the *Lancet*[2] attention is drawn to abdominal palpation as a means of furnishing data from which a diagnosis may be made, while other methods are barren of results.

All information gained during examination of the abdomen may be utilised in the management of any labour. Thus, for example, if there is a pendulous abdomen, postural treatment, the application of the binder, and even the employment of expression, may be deemed requisite; or, again, should palpation reveal the presence of numerous subserous myomata, precautions ought to be taken to prevent post-partum hæmorrhage, etc.

The various points which should be looked for and noted will be referred to in the various parts of the work. Among those which have special bearing on the management of the confinement are the following:—

1. The condition of the abdominal walls, p. 63.
2. The inclination of the pelvis, as indicated by the relationship of the anterior superior spine and the symphysis, and the inclination of the vulva, p. 145.

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[1] Jardine, "Lecture on the Management of Normal Labour and the Puerperium," *Scottish Medical and Surgical Journal*, 1898, p. 405; Pinard, Leopold, International Medical Congress, Moscow, August, 1897.

[2] *Loc. cit.*, p. 3.

3. The general appearance of the abdominal distention, its dimensions, contour, etc., pp. 10, 63.
4. The condition of the bladder, p. 64.
5. The position, consistence, shape and surface of the uterus, pp. 28, 40.
6. The position of the placenta, p. 72.
7. The amount of the liquor amnii in the uterus, p. 69.
8. The attitude, presentation, position, size, movements and mobility of the child, p. 44.
9. The progress during labour, p. 83.

# CHAPTER X.

## ABDOMINAL WALLS—THE BLADDER.

Abdominal Walls: Necessity for Examining—Example—Anteflexion—Hernia—Adipose Tissue Interfering with Examination—Œdema—Tumours, etc.

Bladder: Indicates Necessity for the Catheter—Empty before Forceps—Before Expelling the Placenta—Distinguish from a Tumour—Question of Painless Contractions in.

## ABDOMINAL WALLS.

THE condition of the abdominal walls often calls for attention, especially in multiparæ. In primiparæ the separation of the recti muscles, where the abdominal walls are actively or passively tense, may give the only space through which the uterus may be palpated with any prospect of gaining information. This separation becomes occasionally in multiparæ a source of trouble, as the notes on the following case show:—

Mrs. B. (IV. para.) was admitted to the Glasgow Maternity Hospital in labour. The abdominal examination revealed very thin parietes. The recti muscles were widely separated, and the entire gravid uterus herniated between, the condition being similar to that found in an enormous ventral hernia. All the fœtal parts were easily made out, being only separated from the hand by thinned skin, fascia and uterine wall. During the pains and the voluntary straining the lower uterine segment became nipped between the contracting recti, so that the child's advance was checked. Preparations were made for a forceps delivery, for notwithstanding the application of a binder and the maintenance of the dorsal decubitus with pressure on the fundus, the application of the forceps became absolutely necessary. There was no other abnormality present.

The foregoing case illustrates very well the utility of an abdominal examination.

The condition of the abdominal walls has also much bearing on the presence of an abnormal amount of anteflexion of the gravid uterus. A pendulous abdomen may be due to a sub-involution of the parietes consequent on a previous confinement. In all probability the involution of the abdominal walls has nothing to do with the post-partum application or non-application of the binder. This is a point on which, however, opinions differ.

A case where the gravid uterus herniated between the recti (as the contents of a ventral hernia following abdominal section) has been reported by Sperling.[1]

Fat in the abdominal walls may be developed to such an extent that the examination may be rendered entirely nugatory.

Œdema of the parietes can mask the uterus, especially in the lower segment. This is frequently a concomitant of contracted pelvis, on account of the pendulous state of the abdomen.

## THE BLADDER.

Before examining for the head, etc., the condition of the bladder should be ascertained. The bladder being drawn up by the distending uterus has its accommodation retained by a simultaneous increase in its capacity.

This viscus is often divided into two compartments by the descending head, and though the lower sac may be emptied voluntarily or by means of the catheter, the upper is left full.

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[1] Sperling, *loc. cit.*, p. 26.

On recession of the presenting part the lower compartment will be replenished from above, and the dangers of having this part full will present themselves again. It is only by an abdominal examination that this retention can be observed, and as the bladder in such cases is usually pushed to one or other side (usually the left) it is some help when passing the catheter if we know which way to direct it.

Before applying the forceps or attempting to expel the placenta the bladder should be emptied. The progression of the presenting part tends necessarily to push the vaginal walls before it, and if the distended bladder bulges at all into the parturient canal there is the chance of a cystocele developing. On the other hand, if the third stage is being conducted with an appreciable amount of urine in the bladder, not only will the placenta be more difficult of delivery, but the bladder itself will stand to get injured.

Croft[1] has reported a case where a distended bladder completely masked the pregnant uterus. Such distentions of the organ are more frequently found associated with pelvic tumours.

Contractions of a distended bladder must not be confused with those of the pregnant uterus. Thus a contractile bladder may be taken to constitute one of the fallacies of contraction of the tumour under the hand as a sign of the gravid uterus. This fact has been remarked upon by Jones[2] and Pinard.[3]

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[1] Croft, "Difficulty of Diagnosis between Pregnancy and Tumours of the Abdomen," *Lancet*, 1860, vol. i., p. 85.

[2] Jones, *The Year Book of Treatment*, 1895, p. 349.

[3] Pinard, *loc. cit.*, p. 4.

# CHAPTER XI.

## POSITION OF THE ROUND LIGAMENTS, TUBES AND OVARIES.

Position of Ligaments—During the Pains—The Left most Anterior—Ovary—Ligament of—Tube—Observation of for Diagnosis of Abdominal Tumours, etc.

1. *The Round Ligaments.*—While observing the position of the uterus as indexed by the round ligaments, tubes, etc., the position of these structures may be specially noted for their own sake. They are made out by moving the closely apposed tips of the fingers from the flanks downwards and forwards. The cord-like ridges formed by the ligaments are in most cases easily made out, especially during labour, and where the abdominal parietes are not unduly thick. As these ligaments contain muscle fibres they contract with the uterus during the pains.

In contracted pelves they stand out more plainly, owing to the excessive elevation of the fundus; the fact of one ligament being tenser than the other has been noted as giving a premonition of possible rupture of the uterus.

On account of the right lateral rotation of the uterus the left ligament is most readily identified. The inner border of the rectus muscle should not be confused with this structure. The recti muscles in pregnancy are separated, and the tips of the fingers, while searching for the ligaments, jerk over the margins of the recti, which thus give a sensation not unlike that furnished by the round ligaments while in a state of relaxation.

The question of the determination of the location of the placenta from the position of the tubes and round ligaments is referred to elsewhere (see p. 73).

2. *The Appendages.*—A finger's breadth above and to the outside of the origin of the round ligament are often to be felt the ovary and the tube ; in some favourable cases even the ligament of the ovary is palpable.

Owing to the stretching of the broad ligament (distally to the ovaries) in the course of gestation, the ovary becomes much more of an appendage to the uterus than it is in the non-pregnant state. It thus comes to lie closely attached to the upper lateral aspect of the fundus. It must be remembered that there is often a large expansion of the fundus above the attachment of the round ligaments and the appendages. These latter are to be felt for, at the end of pregnancy, in the flanks at the free margins of the ribs.

The ovary, as a flattened softish body, is felt best by the pulps of the fingers, and its tenderness helps to render its identity easier. During gestation there is a physiological hypertrophy of the ovary with a great increase in its longitudinal diameter ; it is, as it were, flattened out so as to suit the forces of accommodation better. In certain cases of large uterine myomata the ovary has a similar appearance. The intestine, a small fœtal part, or a subserous myoma must be excluded before the small mass under examination can be positively stated to be the ovary.

On account of the right rotation of the uterus, the right appendages become more deeply placed and are thus less readily felt, while for the same reason the left become more superficial, and are correspondingly more easily palpable. The left tube, etc., often come to lie very near the umbilicus. In such a case, as the abdominal wall is thinner at that situation, the details of the adnexa can be observed. The tube is to be felt as a soft gelatinous cord, slipping beneath the fingers. It is not tender unless inflamed.

Above it, can occasionally be separated the ligament of the ovary as a cord of smaller dimensions than the tube.

The antepartum diagnosis of two sets of normal appendages removes the possibility of dystocia arising from a prolapsed ovarian tumour. Should the uterus be in a *normal position* and even only one set of appendages be reached, it is very improbable that the ovary of the opposite side could have formed a tumour sufficient to interfere with delivery.

Having found round ligaments and appendages, on one or both sides, the swelling in the abdomen under observation can be infallibly stated to be the uterus. In a myomatous uterus the ovary may be palpable and the round ligaments are also often tense and hypertrophied.

After delivery, the ligaments of the uterus and the appendages can be examined with the greatest nicety. Sometimes it might be useful to be able to say that at such and such a time these structures were normal.

# CHAPTER XII.

## CONDITION OF THE MEMBRANES—POSITION OF THE PLACENTA.

Condition of the Membranes: Comes to be a Question of the Liquor Amnii As an Indication when to make a Vaginal Examination—Amount —Hydramnios.

Position of the Placenta: Method of Locating—Palpation—Attachment of Round Ligaments and Tubes—Records during Cæsarean Section, during Manual Removal, Curettage, etc.—Traction on the Cord—From Situation of the Rent in the Membranes—Placenta Prævia—Utility of Locating the Placenta.

## CONDITION OF THE MEMBRANES.

In the course of any labour we wish to know if the membranes have ruptured, and when, as a guide to ascertaining the progress of the case.

Early rupture of the membranes is unfavourable, as it implies some divergence from the normal, and complete drainage of the liquor militates in favour of a tedious labour, usually termed "dry".

The importance of the membranes lies in their being a barrier to the escape of the contained liquor. In exceptional cases only do the membranes themselves become of sufficient importance to be considered apart from the liquor amnii. Their excessive thickness or strength occasionally gives rise to dystocia.

From the abdominal point of view, the question of the rupture of the membranes is determined by the presence or absence of liquor in the uterus.

In many cases, as in most primiparæ, even though the membranes have ruptured, the fluid is retained, because the head, which is distending the lower uterine segment and, later, the cervix, blocks the way. Only the merest trickle of fluid is allowed to escape between the pains, when the ball-valve action of the head permits it.

One is much more likely to be correct in saying that because the liquor amnii is still in the uterus, the membranes are intact, than, after vaginal examination, on finding the membranes ruptured, in affirming that there is no liquor in the uterus.

After rupture the dangers of infection are the same as those present during the second stage, for then the interior of the uterus is open to inoculation.

If at the onset of labour we find liquor in the uterus, and on returning later find the same amount (the same tenseness of the uterus, and the same mobility of the fœtus in whole or in part), we may justly conclude that the membranes are intact, and that any sudden gush of fluid that may have occurred can be attributed to the evacuation of the bladder.

The correctness of the diagnosis respecting the membranes depends greatly on practice, and especially does it require considerable practice in internal examination to prevent the surgeon from committing the mistaken kindness of boring a hole in the fœtal scalp while trying to effect the rupture of membranes which have already ceased to be intact.

The condition of the membranes comes to be of importance in the conduction of a labour abdominally; for if a vaginal examination has to be made, it should be done shortly after the rupture. It is also of some moment to know what amount of liquor is still retained by the uterus when the question of operative interference is considered.

The amount of fluid contained by the uterus varies greatly. When the quantity is much diminished the term Oligohydramnios is applied, while, when excessive, Hydramnios.

The various excessive enlargements of the gravid abdomen which have to be differentiated are:—

1. Hydramnios.
2. Twins, etc.
3. Twins, complicated by hydramnios in one sac.
4. Hydrocephalus, monsters, fœtal tumours, ascites, distended fœtal bladder, etc.
5. Tumours complicating pregnancy (including ascitic collections of all kinds).
6. Distended maternal bladder.

1. Hydramnios produces a uniformly tense distention of the gravid uterus, in which the fœtus, as a whole, or fœtal parts, if palpable at all, have an undue mobility (exaggerated ballottement).

2 and 3. Twins *per se* give rise to a very different set of signs; but when complicated by hydramnios, it is fortunate if one of the two conditions be diagnosed. Where the *possibility* of the two conditions being present together is recognised, there will be less chance of error arising.

4. Hydrocephalus, monsters, etc., give rise to very puzzling conditions. Where the hydrocephalic head presents the diagnosis is easier. The other conditions will be impossible of diagnosis at all, except by a process of exclusion (see Hydrocephalus, p. 139).

5. Tumours, etc., complicating pregnancy are often very difficult to recognise, and the conditions vary with each case.

6. A distended bladder, reaching such proportions as to mask the uterus, is rare; yet it has been observed (see p. 65). It is well, however, to remember that even a much less distention of the bladder than that just indicated may give rise to trouble. Exploration with the catheter will indicate the state of affairs.

## POSITION OF THE PLACENTA.

The location of the normally situated placenta by palpation is one of the many factors which help to educate the fingers. The examiner is also enabled to locate the placenta when it happens to be situated in the lower uterine segment.

The site of the placenta may be recognised in a variety of ways, thus :—

1. By direct abdominal examination.
2. By inference : after palpation of the round ligaments and tubes.
3. During Cæsarean section.
4. During manual removal of adherent placenta, on internal examination of the uterine cavity, or on curettage.
5. By gentle tugging on the cord directly after the birth of the child.
6. By observing the position of the rent in the membranes after delivery of the placenta.

1. *Direct Palpation.*—The sensation furnished by the placenta *in situ* is that of a sponge or large nævus, which blankets over part of the ovum ; while beyond its margins the contents of the uterus are more readily felt.

From palpation the placenta seems to be situated mostly in front, and to the right side of the fundus. Owing to the right rotation of the uterus being most common, the placenta appears to be attached mostly behind.

2. Beyer[1] and Leopold[2] have observed independently that the

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[1] Beyer, " Bemerkungen über die Diagnose des Placentarsitzes und über Cervixverhältnisse," *Centralb. f. Gynäk.*, 1895, No. 7, S. 182 ; *Zur physiolog. u. pathol. Morphologie der Gebärmutter*, 1885, S. 625.

[2] Leopold, " Die Diagnose des Placentarsitzes in der Schwangerschaft und während der Geburt," *Geburtshülfe und Gynäkologie*," Leipzig, 1895 ; " Zur Diagnose des Placentarsitzes," *Centralb. f. Gynäk.*, 1895, No. 12, S. 305.

relative situation of the tubes has some connection with the insertion of the placenta, and that where the tubes run on the sides axially the placenta is in front. Müllerheim[1] has investigated the site of the placenta by this method, and has confirmed the diagnosis by direct internal examination after the delivery of the child. He affirms that the site of the placenta has a direct bearing on the position of attachment of the round ligaments and tubes. Palm[2] in his article gives five diagrams to illustrate the relationship between origin of the round ligaments and insertion of the tubes, with the site of the placenta. The figures are described as follows:—

(1) Symmetrical uterus, tubes and round ligaments inserted high and at same level, somewhat near each other = placenta below and behind.

(2) The same, but insertion of tubes, round ligaments, far from each other and at the sides = placenta below and in front.

(3) Uterus more bullet-shaped (round) symmetrical, insertion of tubes and round ligaments deep below umbilicus, near each other on anterior wall = placenta above and behind.

(4) The same, but insertion at sides widely apart = placenta in front and above.

(5) Fundus wide asymmetrical, one cornu better developed, stands higher, insertions apart at the sides and usually high = placenta in cornu.

3. A diagnosis made from these observations has been amply corroborated by Leopold and Haake[3] during Cæsarean

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[1] Müllerheim, *loc. cit.*, p. 3.

[2] Palm, "Ueber die Diagnose des Placentarsitzes in der Schwangerschaft und die Beziehung der Placenta marginata zur Tubenecke," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1893, Bd. xxv., S. 315.

[3] Leopold und Haake, "Ueber 100 Sectiones Caesareae," *Archiv für Gynäkologie*, Bd. lvi., S. 1.

section. They found in 46 cases the placenta in front in 21, and behind, or mostly behind, in 23, while in two it was laterally placed; and again (*Geburtshülfe und Gynäkologie*) in 188 cases the placenta was situated in front in 77, behind in 93, on the right side in 12, and on the left in 6 cases. Murdoch Cameron[1] in his Cæsareans found the placenta usually opposite the abdomen of the child and at the fundus.

4. During manual removal of an adherent placenta, an opportunity is presented of confirming the abdominal diagnosis; and it is also, at least, a guide to know the position of the placenta when attempting to remove it manually. If for any reason curettage is required during the puerperium, the seat of the attachment of the placenta should have more attention given to it. By its rougher surface the former situation of the after-birth, if carefully sought for, may be found.

5. Immediately after birth of the child, and before the complete separation of the placenta, a sudden gentle tug on the cord transmits an impulse through the placenta, uterus and abdominal wall to the hand which is controlling the fundus. The localisation of the impulse to one or other side, to anterior or posterior surface, is not difficult; by this means further evidence as to the placental situation is adduced. Pinard has instanced cases where adherent membranes have been felt to invert the uterus when pulled upon; so that traction on the cord can be quite appreciated in its effects on the uterine wall.

6. The situation of the rent in the membranes, if it is placed remote from the margin of the placenta, or near it, gives some idea as to whether the placenta was inserted into the fundus or lower down. Unfortunately, in many cases, during the process of labour, the membranes get torn and become for this investigation quite useless.

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[1] Cameron, *loc. cit.*, p. 31.

Caruso,[1] from observation of the placental site in 1000 cases, comes to the following conclusions :—

(1) The placenta lies most frequently on the anterior wall.
(2) It is occasionally on the posterior wall.
(3) Seldom is it on the right side.
(4) Its attachment to the left side is most rare.

From these conclusions he draws the following inferences :—

(1) Efforts at expulsion of the placenta must not be persisted in too long, nor should they be at all violent, because of the anterior attachment being most common.

(2) In introducing a bougie for the induction of labour, the bougie should be directed along the left lateral aspect of the uterine cavity.

(3) In Cæsarean section the incision should be made in the fundus.

Regarding Caruso's remarks about passing a bougie towards the left, it is a mistake to have any rule, and as one bougie is rarely enough, bougies should be passed, after palpation, in the directions where the uterus is found free from the placenta.

*Placenta Prævia.*—Placenta prævia usually draws attention to itself from the presence of unavoidable hæmorrhage, which calls for treatment long before term.

A placenta occupying the inferior segment in front masks the fœtal structures, besides preventing the descent of the presenting fœtal pole into the pelvis. If the situation of the placenta is behind, Warden[2] has asked in his article how it can be ascertained by abdominal palpation. Be the placenta in front or behind, it will equally hinder the engagement of the pole requiring to enter the pelvis : it must also be a small

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[1] Caruso, "Ueber den normalen Sitz der Placenta," *Centralb. f. Gynäk.*, No. 28, p. 912; *Verhandlungen der Societa ital. di ort. e gin.*, Bd. iii., Rom., 1897.

[2] Warden, *loc. cit.*, p. 5.

placenta which, occupying the lower uterine segment, does not in this region invade the lateral aspects of the uterus. Again, how could vaginal investigation, before the dilatation of the cervix, indicate a posterior attachment, or, indeed, any other attachment of the placenta, better than an abdominal examination, which has the extra advantage of showing the high situation of the head?

A comparatively low attachment of the placenta—not sufficiently abnormal to require the designation of "prævia"—will delay the usual sinking of the head into the pelvis weeks before term in primiparæ, without giving rise to any other disturbance either at the time or towards the end of the confinement.

Herbert Spencer[1] has reported 7 cases of this abnormality, diagnosed by abdominal palpation. He says the head gives a firm resistance against which the placenta may be manipulated. The lower uterine segment is rendered prominent by the increased bulk of the structures which it has to contain. His diagnoses were verified by internal examination.

In conclusion, the advantages of knowing where the placenta lies are :—

1. Where manual removal is necessary, the previous location of the placenta helps towards the rapid separation of this organ.

2. During curettage extra care and attention should be given to the site of the attachment of the after-birth.

3. Where bougies are to be inserted for induction of labour, the situation of the placenta is to be avoided.

4. If the placenta were known to be anteriorly placed, the fundal incision might be chosen in preference to the anterior : in any case, finding the placenta below the incision during

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[1] Spencer, "The Diagnosis of Placenta Prævia by Palpation of the Abdomen," *Trans. of the London Obstet. Soc.*, vol. xxxi., p. 203, 1889.

Cæsarean section would cause less delay if it had been expected, than if its presence there came as a surprise.

5. The low attachment of the placenta occasionally induces post-partum hæmorrhage, so that where this circumstance of the placental insertion is recognised means may be prepared to overcome and prevent the danger.

# CHAPTER XIII.

## ONSET OF LABOUR—FIXATION OF THE HEAD—PROGRESS.

Onset of Labour: Question of in Primiparæ—in Multiparæ—Pains—Fixation of Presenting Part—Descent.

Fixation of the Head: Completion of—Significance of—Significance of Failure to Become Fixed.

Progress: Method of Ascertaining—Presumption of Dilatation of the Os from Onset of Descent—Prognosis from the Rate of Descent and Amount of Flexion.

## ONSET OF LABOUR.

The decision regarding whether labour has begun or not is best made after abdominal palpation. If the subjective pains coincide with the objective contractions of the uterus, and if these contractions are occurring sufficiently often, labour may be pronounced to have set in. During palpation, especially in multiparæ, painless contractions are sometimes set up by the manipulation entailed by palpation.

Colic, accompanied by painless contractions, simulates labour very closely; but there is a want of correspondence between the pains and the uterine contractions.

It is sometimes necessary to make the decision regarding entrance to hospital depend on whether the gravidum be in labour or not.

In primiparæ the evidences, both abdominally and vaginally, are definite, and the question can be decided precisely. Should a mistake arise there is time to have it rectified. In primiparæ rhythmical contractions of the uterus, accompanied by pain, mean the onset of labour. The fixation of the head, which is a sign of labour, implies, besides other conditions, that there has been sufficient uterine contraction or increased intra-abdominal tension to force the biparietal diameter through the brim. This takes place from two to six weeks before term, though Pinard puts it down as occurring during the last three months of pregnancy, and thinks that it is due to the necessities of accommodation and to the intra-abdominal tension. Brühl[1] writes that in primiparæ before term the head is deeply placed in the small pelvis, and that only a small part remains above the symphysis, and that any exceptional divergence means an abnormality.

Griffith[2] has said, in reference to ascertaining the relative size of the head and the brim, that the weight of the child *in utero* is sufficient to make the head enter the pelvis. The specific gravity of the child being low, its virtual weight *in utero* must be insufficient to cause the forcing of the brim. In Müller's plan for determining the latest time for the induction of labour, the epoch, when the head fits the brim and no more, is taken; chloroform and a considerable amount of force are necessary to make the head enter the pelvis, even when the head is markedly smaller than the brim. If the biparietal diameter has passed the brim then the head is definitely fixed; fixation is, however, often more apparent than real. If, on vaginal examination, a slight upward pressure be applied to the vertex the head is easily displaced. After the onset of labour such mobility is lost and true fixation of the head is present.

By making traction on the head and neck of the child from the abdomen it usually becomes apparent whether the head be truly or only seemingly fixed. The extent to which the head may be lifted out of the pelvis is considerable, and this manœuvre is of use during the reposition of a prolapsed cord, and in turning an occipito-posterior into an occipito-anterior.

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[1] Brühl, "Untersuchungen über den Stand des Kopfes und über die Eindrückbarkeit desselben in den Beckenkanal als prognostisches Moment der Geburt," *Archiv für Gynäkologie*, Bd. xxvi., S. 88.

[2] Griffith, In discussion following a paper by Herman on "Subcutaneous Symphysiotomy," read before the London Obstetrical Society, 4th October, 1900; *Lancet*, 1900, vol. ii., p. 1076.

Jellet[1] in his book says the head is fixed, in primiparæ, three to four weeks previous to term. Leopold and Spörlin[2] state the head to be well inserted into the pelvic entrance at that time; while Haig Ferguson[3] affirms: "It is a well-known fact that in primiparæ the normal position of the fœtal head in the last month of pregnancy is in the cavity of the pelvis". Fixation of the head in a primipara, before the onset of labour, means that the head is prevented from moving laterally, but not from being displaced in an upward direction. Litzmann[4] says that the head has so entered the pelvis in 70·5 per cent. of primiparæ, while Pinard remarks that the head enters the pelvis in primiparæ during the last three months of gestation. In primiparæ, then, this sign of beginning labour cannot be taken much account of; but the other abdominal signs, with the vaginal signs, make the decision an easy one.

In multiparæ, on the contrary, the onset of labour is much more difficult to diagnose; the external signs are of by far the most value. The decision to refuse admission to hospital on the ground that the woman cannot be in labour is dangerous, because in multiparæ the probable date of confinement is of more value, and the arrival of the expected time may be reckoned to be almost a sign of labour. If even the painless contractions be present, and if the os be dilated at all, it will be unsafe to refuse admittance. Anything of the nature of objective pains will decide the matter at once. Though palpable uterine contractions are not of such use as in primiparæ, fixation of the head is, on the other hand, a more reliable sign of the onset of labour.

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[1] Jellet, *loc. cit.*, p. 58.

[2] Leopold and Spörlin, *loc. cit.*, p. 2.

[3] Ferguson, "Observations on Labour, Complicated by a Minor Degree of Pelvic Contraction in Multiparæ and Primiparæ," *Edin. Med. Journ.*, N.S., vol. vi., p. 41.

[4] Litzmann, *Geburt bei engen Becken*, Leipzig, 1884.

In multiparæ, with large pelves, the head may be sunk into the brim some weeks before term; while in others, instead of sinking further into the pelvis, it rises out of it. In the majority, however, the head only enters the pelvis a few days before, or most frequently at the onset of labour; Pinard says during the fifteen to thirty days previous to it. The vaginal signs are in multiparæ, unfortunately, as uncertain as the abdominal, or even more so. The painless contractions may dilate the os to the diameter of a crown piece without labour being present, or without the likelihood of its occurrence for some days to come.

Thus it is that in a primipara abdominal examination gives the earliest signs of the onset of labour in the detection of the objective pains; while in multiparæ the fixation of the head, as observed abdominally, is of more value than dilatation of the os. The diagnosis is often difficult and requires the resort to all means in order to arrive at a conclusion.

## FIXATION OF THE HEAD, ETC.

The position and fixation of the head, besides being of value in the diagnosis of labour, gives also other indications. Should the head be well sunk in the pelvis (even though not fixed), we know consequently:—

1. That the pelvic brim permits engagement, *i.e.*, there is neither a contracted pelvis, hydrocephalus (with certain exceptions, see p. 139), nor a placenta prævia present;
2. That the presentation is neither facial nor brow;
3. That hydramnios does not exist;

4. That if the uterus is in a normal position, and even only one set of appendages felt, then further progress of the head will not be impeded by a prolapsed ovarian tumour;

5. That if (especially during a pain and with fixation of the presenting part) the fœtal heart sounds are distinct, regular and pure, presentation of the cord does not exist.

On the other hand, should the head ballotte freely above the brim during the last month of gestation in primiparæ, or at the onset of labour in multiparæ, then something prevents the head from descending, and a reason for the non-engagement is to be sought for; the common causes of which are:—

1. *Deformed pelvis.*—This may be recognised from the history of the patient, her appearance, the amount of the mobility and position of the fœtal head, the position of the uterus, etc., and the vaginal signs.

2. *Large head.*—This, either with or without contracted pelvis, may be recognised as it sits over the pubes. A hydrocephalic head, if presenting, produces a very characteristic appearance. In multiparæ, where the history of previous labours does not reveal the condition, and where there were no previous difficulties, a minor degree of contracted pelvis with a larger and more rigid head would account for the non-engagement.

3. *Oblique presentations.*—These are very easily recognised; their cause should be discovered.

4. *Face and brow presentations.*—These require careful observation. Their diagnosis depends on the recognition of the brow, occiput, chin, with other corroborative evidence (see diagnosis of presentation and position, p. 131). It is uncommon for brow cases ever to become even apparently fixed unless in premature births; facial cases can of course engage and progress, though the engagement does not take place readily but only after the lapse of a considerable interval.

5. *Hydramnios.*—As a cause of non-engagement of the head, this seldom continues long—rupture of the membranes relieving

the condition. If this state be recognised during the abdominal examination, preparation to rupture the membranes may be made, and this carried out during the vaginal examination made to confirm the diagnosis and to eliminate other possibilities. The same remarks apply to the somewhat rare condition of tough or thick membranes.

6. *Tumours obstructing the pelvic inlet.*—These will give the signs of contracted pelvis, plus the special symptoms characteristic of the variety present.

7. *Twins.*—These give rise to very evident signs, which are only likely to be confused with hydramnios (see pp. 14, 71).

8. *Monsters, fœtal tumours, etc.*—Their diagnosis requires all the available means at the command of the observer, and in most cases will be impossible.

9. *Short cord.*—This though denied by some to be capable of delaying engagement, certainly does so occasionally (see auscultation, p. 94).

Suffice it to say, that in all cases where the head ought to be in the pelvis, and is not found to be there on abdominal examination, a vaginal exploration is indicated.

## PROGRESS OF LABOUR.

The progress of labour can be gauged quite as well from the abdomen as from the vagina.[1] Granted that the head has been found in the pelvis, the progress can be observed by noting how much the head has descended during any given interval. The fixed point is the pubic crest.

During the first stage there is little downward movement of the head. Especially is this noticeable in primiparæ, where always at the onset of labour, in normal cases, the head is well descended into the pelvis. Marked progress takes place only when the os becomes fully dilated, the pains previously expending their force in dilating the os and cervix over the presenting part. In primiparæ one observes that during the first stage the head remains practically stationary; but when distinct advance begins, it may be asserted that the os is fully dilated. In the majority of cases the membranes will rupture about this stage, and it is then that the single vaginal examination may be made. The head has traversed by this time half of the bony passage, *i.e.*, the second stage of labour is well entered upon before the end of the first.

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[1] Leopold and Spörlin, *loc. cit.*, p. 2; Sandberg, "The Management of Labour by External Examination," *Journal of the American Medical Association*, 1897, vol. xxviii., p. 968.

Delay in the descent of the head, as gauged from the abdomen, may be due to various conditions, such as intra-pelvic tumour, rigid os, inertia, etc., all of which remove the case from the normal class, and all of which require vaginal examination.

In multiparæ the descent of the head is more uniform, and the bag of waters plays a more important part in the dilatation of the os than the head. The soft parts offer less resistance, and the length of labour depends, in addition to the pains, on the relative size of the pelvis and the fœtal head. Thus, if we can at the onset of labour estimate how quickly the head is disappearing into the pelvis, we have a reliable basis upon which we may work.

In both primiparæ and multiparæ when the head is out of reach from the abdomen it is not far from producing visible bulging of the perineum, and is already at the pelvic floor.

The practical value of determining the stage of labour and its rate by observation from the abdomen appears when two or three cases have to be managed concurrently. Where the practice is large, abundant opportunities are offered for education in all the methods of external examination and for perfecting one's knowledge of the details. This reckoning of the advance of labour by abdominal examination saves much time, which otherwise would be taken up in rendering the hands as surgically clean as possible.

Besides the progress of labour a prognostication can, in the majority of cases, be risked regarding the course. It is safer to give some idea of the duration of the confinement from data culled from the abdomen, than from those furnished by a vaginal examination.

The amount of flexion of the head can be very readily estimated. If the flexion be excessive, as shown by a large difference in level between the occiput and the brow or chin, then it is evident that the head is a tight fit for the pelvis, and that the greater degree of moulding which will thus be required will consequently retard delivery.

If, on the other hand, the head is descending into the pelvis in a semiflexed position, the confinement may be expected to be short and easy, and it will be advantageous to warn the patient to avoid putting off going to bed. (In certain cases where the head is too large for the pelvis semiflexion exists; in these cases, however, the head tends to remain high.)

Both the size of the fœtal head and the size of the child may be thus estimated. These are of special importance in connection with contracted pelvis.

# CHAPTER XIV.

## AUSCULTATION IN THE MANAGEMENT OF LABOUR.[1]

A. The Fœtal Heart Sounds:—
  - I. Historical.
  - II. Rhythm.
  - III. Incident.
  - IV. Frequency—
    1. Sex.
    2. Size.
    3. Maternal Influences.
    4. Conditions affecting the Fœtal Heart through the Circulation.
  - V. In the Diagnosis of Pregnancy.
  - VI. In the Diagnosis of Twins, etc.
  - VII. In the Diagnosis of Presentation, etc.

B. The Funic Souffle:—
  - I. Historical.
  - II. Nature and Causation.
  - III. Indications.

C. Fœtal Movements.

D. The Uterine Souffle.

E. Muscular Susurrus.

F. The Sound of Gas in the Uterus.

G. Placental Separation Bruit.

## A. THE FŒTAL HEART SOUNDS.

**I. Historical.**—The fœtal heart sounds were discovered accidentally by Mayor,[2] of Geneva, in 1818, while auscultating for fœtal movements.

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[1] Formed the subject of a paper read at a meeting of the Glasgow Obstetrical and Gynæcological Society, held on 23rd May, 1900, *Transactions*, vol. ii., p. 209.

[2] Mayor, *Bibliothèque Universelle de Genève*, Novembre, 1818, t. ix., p. 248.

Somewhat later, but independently, Kergaradec[1] made the same discovery, and he considerably advanced the subject of obstetric auscultation. Since his time much has been done to systematise the subject and place it on a firm basis.

**II. The Rhythm.**—Kergaradec compared the sounds he heard to the ticking of a watch, which, superficially, they much resemble. Churchill,[2] in an article on this subject, draws attention to this point, and affirms that the rhythm of the fœtal heart differs somewhat from that of the adult. He divides the cardiac cycle into four periods, the first two being occupied by the sounds and the latter two by the pause. He differs from other observers before him in thinking that the systolic sound is the fainter of the two, and that it is the second sound which is accentuated. Expressed in figures, it is thus, 1̣2̣́34. After birth of the child the rhythm becomes 1̣23̣4, both sounds being followed by an equal pause. This gradually passes (after the second year) into the adult time, with the accentuation on the first sound, thus, 1̣́2̣34. The author agrees with Churchill in thinking that the accentuation is on the second sound.

**III. Incident.**—The usual time when the fœtal heart can be first heard is stated to be from the eighteenth to the twentieth week. Underhill[3] has reported a case where he heard it between the thirteenth and fourteenth week. There can be no doubt that the time when the sounds become audible varies greatly, and so is of little use in fixing the probable date of confinement.

**IV. Frequency.**—The variation in frequency of the fœtal heart pulsations has given rise to much discussion, and it has received a corresponding amount of attention. Hüter,[1] in attempting to reconcile the discrepancies, points out that these may be due to national characteristics or geographical conditions.

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[1] Kergaradec, *Mémoire sur l'auscultation appliquée à l'étude de la grossesse*, Paris, 1832.

[2] Churchill, "Rhythm of the Heart of the Fœtus," *Dublin Quarterly Journal*, 1855, vol. xix., p. 327.

[3] Underhill, "Note on a Case in which the Fœtal Heart was Heard at an Early Period in Pregnancy," *Edinburgh Medical Journal*, 1875, p. 267.

The counting of the fœtal heart beats is not such an easy matter as it appears. The sounds are often quite alike, and, by mistake, both may be counted.

As the rate varies within the period of one minute, a number of observations should be taken for periods of not less than fifteen to thirty seconds. The counting should be done between the pains and during a period of fœtal quiescence, as movements naturally hasten the heart's action.

Authorities have given the following averages, which differ considerably from one another, thus: Carus,[2] 130; Nägele,[3] 135; Depaul[4] and Hohl,[5] 140; Dubois,[2] 144; Nägele (son),[2] 175. The limits, however, vary greatly: thus, 120 to 180 beats per minute lie within the recognised normal range. Depaul mentions one case where the frequency rose to 210 without detriment to the child following. This high rate has been explained by other observers, who state that in such cases both sounds may have been counted. The author has observed one case where the rate was 170. Below 120 must be considered pathological, and especially so if the rhythm is also irregular.

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[1] Hüter, "Ueber den Fötalpuls," *Monats., f. Geburtsk.*, Bd. xviii., Supp. Heft, S. 23.

[2] From Cumming, "On the Uterine Souffle and the Fœtal Heart," *Edinburgh Medical Journal*, 1875, vol. xxi., pt. 1, p. 230.

[3] Nägele, *loc. cit.*, p. 18.

[4] Depaul, "Auscultation obstétricale," *Dictionnaire des Sciences Médicales*, 1867, p. 301. (At the end of this article is a full list of literature on obstetric auscultation.)

[5] Hohl, *Die Geburtshülfliche Exploration*, Halle, Bd. i., S. 80.

According to Frankenhäuser[1] there is not much alteration in the frequency during the course of pregnancy; while Hohl states that the younger the fœtus the more rapid is the pulse. If Frankenhäuser's statement be the true one, the size, which must vary with the age of the fœtus, has nothing to do with the heart frequency. The rate of the pulsations will be settled as soon as the heart begins to beat, and for each particular ovum this will be fixed by a vital physiological law. This fundamental frequency may be influenced by size and sex, the rate depending on the vigour of the heart, and the resistance it has to overcome.

The circumstances which influence the frequency are: 1. Sex; 2. Size; 3. Maternal conditions; 4. Those affecting the circulation of the fœtus.

1. *Sex.*—Frankenhäuser made the discovery that the female fœtal heart beats more rapidly than the male, and in his article he puts down the figures as 124 for the male and 144 for the female. Shortly after the publication of his paper, numerous others made their appearance controverting this observation.

Breslau[2] states categorically that neither during intra-uterine nor extra-uterine life does the fœtal heart beat quicker in females, and, indeed, he gives the average for males as 119 and for females as 113.

Hennig[3] agrees with Breslau that the frequency of the fœtal heart does not depend on the sex.

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[1] Frankenhäuser, "Ueber die Herztöne der Frucht und ihre Benutzung zur Diagnose des Lebens, der Stellung, der Lage und des Geschlechts derselben," *Monats. f. Geburtsk.*, Bd. xiv., Heft 3, S. 161.

[2] Breslau, "Ueber die Frankenhäuser'sche Entdeckung das Geschlecht des Fotus durch Zählung der Herztöne erkennen zu können," *Monats. f. Geburtsk.*, Bd. xv., S. 437.

[3] Hennig, "Ueber die Häufigkeit der Herzschläge beim Fötus und bei Neugeborenen von verschiedenen Geschlechtern," *Monats. f. Geburtsk.*, Bd. xv., S. 449.

Haake[1] and Schurig[2] alike doubt the verity of the discovery of Frankenhäuser.

Zepuder[3] gives the average of 130 for males and 144 for females; but says it is impossible to diagnose the sex beforehand: a guess only being possible, the result of several observations.

Engelhorn[4] puts down 137·7 as the average for males and 140·8 as that for females; while in his cases the slowest were females and the most rapid males.

Steinbach,[5] on the other hand, thinks the idea of Frankenhäuser of some value, and at the present time it is generally conceded that the female heart beats slightly more rapidly than the male.

Owing to the wide variations from the average, it becomes very difficult to decide in any given case how far the frequency of the fœtal pulsation depends on the sex.

2. *Size.*—Engelhorn and Cumming[6] have mooted the idea that the fœtal heart rate may depend on the size of the child. Engelhorn has given the following table (in which the size of the child is gauged by its length) to show the ratio between the size and the frequency:—

40-45 cms. get 147·9 beats.
45-50 ,, ,, 137·9 ,,
over 50 ,, ,, 126·6 ,,

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[1] Haake, "Ueber den Werth der Frankenhäuser'schen Entdeckung, aus der Frequenz der Fötalherzschlage das Geschlecht des Fötus zu bestimmen," *Monats. f. Geburtsk.*, Bd. xv., S. 456.

[2] Schurig, "Beitrag zur Vorausbestimmung des Fötalgeschlechtes durch Zählung des Fötalpulses," *Monats. f. Geburtsk.*, Bd. xxi., S. 459, Inaugural Dissertation, Leipzig, 1863.

[3] Zepuder, "Neue Beobachtungen über den Werth der Frankenhäuser'schen Theorie," *Zeits. f. prakt. Heilk.*, No. 2, 1863.

[4] Engelhorn, "Ueber die fötale Pulsfrequenz," *Arch. f. Gynäk.*, Bd. ix., S. 360.

[5] Steinbach, "Zur Diagnose des Fötalgeschlechts," *Monats. f. Geburtsk.*, Bd. xviii., S. 428.

[6] Engelhorn; Cumming, *loc. cit.*, p. 88.

He thinks that this factor should be taken into consideration in attempting to diagnose the sex of the child *in utero*.

Cumming, on the other hand, has measured the size of the child by its weight. He placed his figures in the hands of a mathematician, whose calculations brought out the result that the male child gives nineteen beats per pound; the female child gives 20·2 beats per pound. He agrees to some extent with Frankenhäuser, but thinks that a certain relationship exists between weight of the child and frequency of its heart sounds. This latter statement somewhat modifies the precision of his averages. Cumming, however, gives no idea how the weight of the child is to be ascertained.

According to Ahlfeld[1] and Sutugin[2] the length of the fœtus equals twice the distance from the pubes to the fundus. Zweifel[3] dissents from this view.

From cases occurring in the Glasgow Maternity Hospital and elsewhere, though some ratio between length and weight and frequency of the fœtal heart was found, there were too many exceptions to allow of any definite conclusions being come to. On drawing out a table to show the relationship, if any, between weight, length, sex and heart rate, there were so many irregularities that no hard and fast rule could be drawn. It is only possible to say that the weight has more influence on the fœtal heart than the length, and if taken in conjunction with the frequency, aids in the antepartum guess as to the sex of the child.

From consideration of the factors influencing the rate of the fœtal heart, is it possible to determine the sex of the child previous to birth? Admitting that sex and size have each their influence,[4] are the data precise enough to warrant any prognostication in this direction? As the weight of the child can be estimated by palpation with a fair amount of accuracy, while the fœtal heart sounds may be correctly counted, it is possible, by considering the weight, to increase the probability of a successful guess regarding the sex of the child *in utero.* The question has not been reduced to such simple terms as to enable one to say that so many beats per minute should accompany each male or female pound. Still the attempt is invariably made, and the surmise revealed to the patient. By so doing, a little wholesome humour is introduced into what otherwise might be considered a uselessly prolonged examination. In connection with the diagnosis of sex, there are said to be other factors which may guide one in the prognosis.

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[1] Ahlfeld, *loc. cit.*, p. 23.

[2] Sutugin, *loc. cit.*, p. 23.

[3] Zweifel, *loc. cit.*, p. 24.

[4] Schröder, *loc. cit.*, p. 24; Spiegelberg, *loc. cit.*, p. 23.

Drummond Macdonald,[1] in the correspondence column of the *Lancet*, has reported that where the abdomen is conoid and projecting the fruit will be a male, while if flatter and oval a female. As there is no standard abdominal conformation, it is difficult to see how this gives any help.

In Germany there is a popular idea that the more the complexion and the facial expression are altered and marred, the more likely is the child to be a female. This is referred to in Hohl's work,[2] and he gives it his support.

Stockton-Hough[3] in discussing the question ascribes the idea to Avicenna. Carlile[4] has reported that with male conception the nipple and areola are very dark. There are a number of other expressions of opinion on the diagnosis and causation of sex, more or less vague. Finally, the diagnosis of sex from the fœtal heart must be what may be termed a fortified guess.

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[1] Macdonald, "The Antegenetic Discovery of Fœtal Sex," *Lancet*, 1883, vol. i., p. 222.

[2] Hohl, *loc. cit.*, p. 88.

[3] Stockton-Hough, "An Inquiry Concerning the Relative Influence of the Sex of the Fœtus *in Utero*, on the Mental, Physical, Physiological, Pathological and Developmental Condition of the Mother during Gestation, Lactation and Subsequently," *American Journal of Obstetrics*, 1884, vol. xvii., p. 113.

[4] Carlile, *Med. Record of New York*, 1880, p. 554 (Stockton-Hough).

3. *Maternal Influence.*—Various reports are given as to the influence of the maternal pulse-rate on that of the offspring. It is generally accepted that, unless the maternal pulse is accelerated by some cause which operates through the circulation, little effect is produced on the fœtal heart. In cases of enteric fever and small-pox, the fœtal pulsations have been observed to rise with the rise in the pulse, and especially with the increase in the temperature of the mother.[1] Hüter[2] discusses this subject fully, and gives details of cases where the pulse of the fœtus was influenced by that of the mother. Hohl remarks that the nearer to term, the less influence have these and other conditions on the fœtal heart frequency. Excitement and exercise, though they raise the maternal pulse, have no bearing on that of the fœtus. Naylor[3] reports a series of cases where observations, taken two hours after meals, showed the fœtal heart to be acting more rapidly than in the period previous to the ingestion of food. If this be the case, it is difficult to explain, and is contrary to the general opinion.

4. *Conditions Affecting the Fœtal Heart Frequency through the Circulation.*

(1) Churchill[4] mentions that ergot slows the heart; due probably to the interference with the placental circulation by the uterine contraction.

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[1] Fiedler, "Ueber das Verhalten des Fötalpulses zur Temperatur und zum Pulse der Mutter bei Typhus-Abdominalis," *Monatsschrift für Geburtskunde*, Bd. xix., S. 471, enteric; and Hohl, *loc. cit.*, p. 88, small-pox.

[2] Hüter, *loc. cit.*, p. 88.

[3] Naylor, "Observations Demonstrating the Influence of Digestion in the Mother upon the Frequency of the Fœtal Pulse," *Edin. Med. Journ.*, 1876, vol. xxi., pt. 2, p. 1004.

[4] Churchill, *loc. cit.*, p. 87.

(2) The pains of labour first hasten, then slow, the fœtal pulse. When the pains are at their height the fœtal heart sounds may be inaudible.

Kehrer[1] does not think the matter settled, whether the slowing of the heart during the pains is due to cranial pressure or not. Schultze thought it due to slight asphyxia, while Schwartz stated it to be due to irritation of the vagus (Kehrer's paper).

(3) Pressure on, or other interference with, the cord sufficient to impede the circulation rarely fails to affect the heart sounds, either in frequency, regularity or character. Numerous cases have been reported bearing on this point. Schatz[2] gives an example where pressure with the stethoscope over the region of the child's neck reduced the speed by one-half, and led to a correct diagnosis of coiling of the cord round the child's neck. He also mentions a similar case reported by Rodner.

Two cases were reported by the writer in the *British Medical Journal* of August, 1897, where the head was prevented from engaging by a cord becoming too short by being wound round the child's neck. In neither case was a funic souffle heard, but in one the pains entirely obliterated the sounds, while in the other they produced marked alterations in rhythm and intensity. Wygodzki,[3] Duncan[4] and Napier[5] report dystocia from the same cause. Kauffmann[1] reported a case requiring the forceps. Rachel[2] also has reported five cases of dystocia due to this relative shortening of the cord, but in his signs for diagnosis of the condition, no stress is laid on those found on auscultation, which are by far the most important.

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[1] Kehrer, "The Causes of the Variation of the Fœtal Pulse during Uterine Contraction," *Amer. Journal of Obstet.*, 1879, vol. xii., p. 192.

[2] Schatz, "Ueber die schon in der Schwangerschaft und in der ersten Hälfte der Geburt zu stellende Diagnose der Umschlingung der Nabelschnur," *Arch. f. Gynäk.*, Bd. xxv., S. 158.

[3] Wygodzki, "Eine siebenmalige Nabelschnurumschlingung um den Hals des Kindes als Geburtshinderniss," *Centralb. f. Gynäk.*, 1895, No. 21, S. 561.

[4] Duncan, "On Shortness of the Cord as a Cause of Obstruction to the Natural Progress of Labour," *Transactions of the London Obstetrical Society*, vol. xxiii., p. 243.

[5] Napier, "Umbilical Cord round the Child's Neck as a Cause of Delayed Labour, and sometimes of Infantile Death," *Transactions of the Edinburgh Obstetrical Society*, 1882-83, vol. viii., p. 26.

Weidemann[3] says the condition may be diagnosed from the following :—

(i.) The presence of the funic souffle.

(ii.) The recession of the presenting part in the interval between the pains.

(iii.) One-sided pain in the abdomen (Wigand).

Rachel adds :—

(iv.) Variability of the position of the head within narrow limits.

(v.) Discharge of some blood immediately after each pain.

While Brickner[4] adds still another :—

(vi.) Frequent emptying of the bladder in the pauses between the pains.

It is, of course, a question whether, when traction is put on the funis round the neck, the fœtal heart sounds are interfered with because of the obstruction in the cord, or in the large vessels of the neck.

Prolapse of the cord, without compression, will give no sign of its presence during auscultation, but the signs, on palpating, will reveal the primary abnormality. As a primary condition, without other abnormality, prolapse of the cord is uncommon. Thus, contracted pelvis, transverse presentation, etc., may be easily observed.

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[1] Kauffmann, "Nabelschnurumschlingungen als Geburtshinderniss," *Monats. f. Geburtsk.*, Bd. xiv., Heft 3, S. 175.

[2] Rachel, "Five Cases of Dystocia from Coiling of the Cord around the Neck of the Fœtus," *Amer. Jour. of Obstet.*, 1884, vol. xvii., p. 918.

[3] Weidemann, *Bemerkungen über die Umschlingungen des Nabelstrangs um die Frucht nebst Beschreibung zweier Fälle von tödlichen Nabelstrangsumschlingungen*, Inaugural Dissertation, Marburg, 1856.

[4] Brickner, "A Short Umbilical Cord as a Cause of Dystocia, with a Description of a New Symptom," *American Journal*, 1898; from *Jahresbericht über die Leistungen und Fortschritte in der Gesammten Medicin*, 1899, Bd. ii., S. 629.

(4) Auscultation of the fœtal heart is of much importance in helping to arrive at a decision regarding interference on behalf of the child.[1] Extreme rapidity of the fœtal heart's action is quite compatible with a normal and healthy child, and does not necessarily imply danger. Quite another matter is preternatural slowness. When the rate is below 100-120, there is evidently some interference with the circulation. Martin[2] refers to this point too. As has already been remarked, slowness combined with diminution in volume or with irregularity is of serious import for the infant. Frankenhäuser mentions that it is a grave sign for the child when, after reposition of a prolapsed cord, the heart sounds remain at 80. Irregularity, combined with slowness, is a more urgent sign for hastening delivery than bradycardia alone.

The absence of the fœtal heart sounds contraindicates Cæsarean section.

Pressure on the cord occasionally alters the characters of the sounds and substitutes for the first sound a murmur, V.S. in rhythm. This point will be further referred to under the head of Funic Souffle.

**V. In the Diagnosis of Pregnancy.**—The observation of the fœtal heart sounds is, of the " certain " signs of pregnancy, the most certain. In every case after the seventh month these sounds should be heard if the child is alive. The circumstances which interfere with the auscultation of the heart are :—

1. Thick abdominal walls, *e.g.*, œdema, adipose tissue—generalised or as a tumour formation.

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[1] Höfft, " Beobachtungen über Auskultation der Schwangern," *Neue Zeitsch. f. Geburtsk.*, 1838, Bd. vi., Heft 1, S. 1.

[2] Martin, *loc. cit.*, p. 31.

2. A deep layer of liquor between the stethoscope and the child will mask the sounds, but sinking the instrument till the resistance of the solid fœtus is felt will overcome this.

3. The presence of adventitious noises will prevent the beats from being heard. Of these the commonest are intestinal sounds: the phonendoscope thus gives little aid in the diagnosis.

4. Want of practice on the part of the observer, etc.

**VI. In the Diagnosis of Twins, etc.**—Kergaradec[1] was the first to apply auscultation to the antepartum diagnosis of twins. Nagle[2] claimed to have been the first in this country to have done so. It is on record that Nägele (son)[3] diagnosed triplets by this means.

The diagnosis of plural conception by palpation is usually easy, but by auscultation alone it is more difficult. The presence of two distinct areas of maximum intensity is a very uncertain sign, and may often be observed in an ordinary single gestation. The hearing of both fœtal hearts acting together, but with different rhythms is, however, circumstantial evidence[4] (see Diagnosis of Twins, p. 14).

**VII. In the Diagnosis of Presentations, etc.**—The discovery of the area of maximum intensity above the umbilicus is strongly suggestive of breech presentation. The use of the umbilicus as a landmark is of very questionable validity, and will therefore diminish the value of this sign as an aid to the diagnosis of presentation or position. Taken in conjunction with palpation the fœtal heart sounds are of very great utility, especially where the back is anterior. Auscultation, too, is best performed after careful palpation. When we know the attitude of the child, we are able to place the stethoscope on the spot where the fœtal heart should best be heard.

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[1] Kergaradec, *loc. cit.*, p. 87.

[2] Nagle, "On the Use of the Stethoscope for the Detection of Twins *in Utero*," *Lancet*, 1830-31, vol. i., p. 232.

[3] From Depaul, *loc. cit.*, p. 88.

[4] Küneke, *loc. cit.*, p. 15.

In facial presentations where the thorax of the child is pressed against the uterine wall, the situation of maximum intensity is said to be directly over the fœtal heart,[1] *i.e.*, the fœtal heart is best auscultated on the same side as the limbs;[2] indeed, in facial presentations, Attensamer,[3] Duval,[4] Fischel,[5] Fleishmann[6] and Valenta[7] have reported cases where the cardiac pulsations of the fœtus were directly palpable. Fischel has remarked that it is not essential for the abdominal parietes to be thin, and he has noted the phenomenon in breech cases where the abdomen of the child has been anterior.

Where the area of maximum loudness is below the umbilicus, the probability is that the presentation is a cranial one, though in transverse cases the heart sounds will be in much the same situations as in cranial.

During the progress of labour the auscultation area descends with the child, and the sounds, often inaudible in their former site, are readily heard over the pubes.

It is asserted that the right or left position can be diagnosed according as the sounds are best heard right or left of the middle line. This is even more fallacious than the diagnosis of position from palpation of the child's back.

In dorso-posterior positions the area of maximum intensity becomes very wide; conduction of the sounds taking place through the limbs, and perhaps through one or other flank of the fœtus. The situation of the sounds is in these cases quite useless for the diagnosis of position.

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[1] Depaul, Schröder, *loc. cit.*, p. 5. [2] Leopold and Spörlin, *loc. cit.*, p. 2.

[3] Attensamer, Inaugural Dissertation, Würzburg, 1885.

[4] Duval, "Palpation of the Fœtal Heart Impulse in Pregnancy," *Johns Hopkins Hospital Bulletins*, Baltimore, 1897, vol. viii., p. 207.

[5] Fischel, "Zur intra-uterinen Tastbarkeit des fötalen Herzimpulses bei Dexioflexionslagen," *Centralblatt für Gynäkologie*, 1885, No. 49, S. 767.

[6] Fleishmann, "Tastbarkeit des fötalen Herzstosses bei Gesichtslage I.," *Centralblatt für Gynäkologie*, 1885, No. 52, S. 830.

[7] Valenta, *Prager Medizinische Wochenschrift*, 1885, No. 45.

## B. THE FUNIC SOUFFLE.

**I. Historical.**—The funic souffle was discovered and so named by Evory Kennedy.[1] He believed it to be produced in the cord by pressure on it. That the souffle is produced by pressure on the cord is generally accepted; but this is very different from affirming that the sound is produced *in* the cord.

**II. Nature.**—Dakin[2] remarks that the sound is without doubt produced in the cord from pressure. Devilliers[3] agrees with this. Dakin and Kennedy remark that the cord may not infrequently be felt to lie over the back of the child; the author has observed this feature also. Kehrer[4] reports a case where the cord was felt on abdominal palpation, and pressure with the stethoscope produced the souffle. He believes the sound is produced in the cord. Nägele[5] asserted that the sound was rarely absent in coiling of the cord round the neck. Frankenhäuser[6] says it is produced by (1) winding of the cord (especially a thin one) round fœtal parts; (2) knots in the cord; (3) prolapse of the cord. He mentions that light pressure is sufficient to produce it, while more complete pressure stops the souffle, and he thinks it is a sign of winding of the cord round the child's neck, etc. Four cases are cited by him, in all of which the funic souffle had been heard previous to the birth of still-born children with the funis round their necks. According to this writer the sound is produced in the funic arteries. Dubois

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[1] Kennedy, *Observations on Obstetric Auscultation*, Dublin, 1833.

[2] Dakin, *loc. cit.*, p. 48.

[3] Devilliers, "Recherches sur le diagnostic et la valeur du bruit de souffle ombilicale," *L'Union Médicale*, No. 11, 1854, p. 44; *Monats. f. Geburtsk.*, Bd. iii., S. 234.

[4] Kehrer, "Zur Aetiologie des Nabelschnurgeräusches," *Arch. f. Gynäk.*, Bd. xii., S. 258.

[5] Nägele, *loc. cit.*, p. 18.

[6] Frankenhäuser, "Ueber Nabelschnurgeräusch, Nabelschnurdruck und Hirndruck," *Monats. f. Geburtsk.*, Bd. xv., S. 354.

(from Depaul) thought it connected with the fœtal heart. Carrière (from Depaul) is not dogmatic, and remarks that the murmur cannot be produced after birth by pressure on the cord.

Depaul[1] has found the souffle immediately after birth, and disappearing on the second day. Massmann[2] has reported a case where the souffle was heard *in utero*, and mitral disease of the child's heart was found at the post mortem. He, however, omitted to auscultate the heart after the child's birth. The possibility of the murmur being produced in the cord is denied by him; he doubts if it is even produced by pressure on the cord. Hall[3] has reported a case of fœtal endocarditis with a murmur diagnosed before birth, the first sound being rough and blurred. Schröder[4] remarks that when it is from heart disease the murmur should persist post-partum. Hüter[5] and Schwartz[6] think the souffle is a V.S. heart murmur. Beck, Hohl and Kiwisch (from Bumm) agree that the funic souffle is an altered first cardiac sound. Scanzoni[7] says it is due to a functional heart murmur, because the sound is too loud to be produced in the small vessels of the cord. Spiegelberg[8] states that the murmur rarely arises in the fœtal heart. Bumm,[9] in an elaborate article on the funic souffle, comes to the following conclusions:—

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[1] Depaul, *loc. cit.*, p. 88.

[2] Massmann, "Fall von Nabelschnurgeräusch," *Monats. f. Geburtsk.*, Bd. iv., S. 81.

[3] J. N. Hall, "Detection of Fœtal Heart Murmur in Gravida, with Report of a Case," *Archives for Pediatrics*, 1897, vol. xiv., p. 905.

[4] Schröder, *loc. cit.*, p. 5.

[5] Hüter, *loc. cit.*, p. 88.

[6] Schwartz, *Die Vorzeitigen Athembewegungen*, Leipzig, 1856 (from Hüter).

[7] Scanzoni, *Lehrbuch der Geburtshülfe*, vierte Auflage, S. 162.

[8] Spiegelberg, *loc. cit.*, p. 23.

[9] Bumm, "Zur Aetiologie des Nabelschnurgeräusches," *Arch. f. Gynäk.*, Bd. xxv., S. 227.

1. The souffle is due to temporary valvular insufficiency from anomalies in nutrition, function, etc.

2. It is due to changes in cardiac tension.

3. This may be caused by external pressure, such as pressure applied to the thorax of the infant experimentally.

4. Pressure on the cord, by increasing the action of the heart, changes the first sound into a murmur. Though pressure produces the murmur, that does not mean that the murmur is produced in the cord.

5. The souffle cannot be heard post-partum because of the instantaneous changes produced by respiration.

6. The site of the sound changes with the position of the child and with the heart sounds.

According to Frankenhäuser[1] the souffle may be heard during the last two months of pregnancy, and perhaps for longer. He states in support of the view that the sound is produced in the funis, that it is often heard far from the fœtal heart sounds.

The murmur is heard in a large number of cases where the cord is not round the neck. In one case the writer noted, during auscultation, that suprapubic pressure (in the region of the fœtal neck) produced a murmur masking the first sound. The experiment was repeated a number of times with the same result. The bruit began shortly after the pressure was applied; it became intensified with continued pressure, and was accompanied by a slowing of the fœtal heart rate. After removal of the pressure the murmur persisted for from ten to twenty seconds. On delivery the cord was found round the neck of the child as was suspected. Previous careful palpation of this region almost made it certain that the cord was under observation. In another case, where the cord was distinctly palpable as it lay over the back of the infant, pressure on the funis failed to produce a souffle; but the heart sounds were enfeebled and slowed; extreme pressure stopped the heart sounds. In this instance the umbilical arteries could be distinctly felt pulsating at the same rate as the fœtal heart pulsated when auscultated. Spöndli[1] has reported a case where the souffle was accompanied by coiling of the cord round the neck.

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[1] Frankenhäuser, *loc. cit.*, p. 99.

Hochsinger[2] says that the persistence of the ductus arteriosus produces a loud murmur V.S. in rhythm with great accentuation of the second pulmonic sound. (The duct is closed from the fourth to the tenth day.)

The characters of this murmur have convinced the author that it is produced in the fœtal heart or large vessels. Compression of the cord slight enough to cause some change in the tension of the general circulation, by merely delaying the return of the arterial blood through the umbilical vein, might quite readily lead to the development of a murmur. Before pressure became sufficient to interfere with the stream in the umbilical arteries, the circulation in the veins would be stopped completely. Thus, slight pressure on the cord would reduce the supply of oxygenated blood to the fœtus, and the want of blood would produce a fall in cardiac tension, thus giving rise to a hæmic murmur, just as occurs in the anæmia of hæmorrhage. Further, the deprivation of oxygen would cause slowing of the fœtal heart. The murmur conveys the impression to the ear that it is situated in the fœtal heart. To say that this cannot be so, because the bruit may be heard with a pure first sound, is to forget that the heart sounds are produced in the fœtus, as in the adult, from a right and left heart acting together. The hæmic murmur in the adult, with its wide distribution, may co-exist with a normal heart sound. The functional murmur may be in the right heart or large vessels while the normal first sound is produced in the left. The fact that the bruit produced by pressure in the groove of the neck in the case referred to did not immediately cease on withdrawal of the pressure, goes far to show that the murmur was not produced in the cord locally, but in the heart by compression of the cord.

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[1] Spöndli, "Geburtshülfliche Abhandlungen," *Monats. f. Geburtsk.*, Bd. iii., S. 198.

[2] Hochsinger, *Die Auskultation des Kindlichen Herzens.*

The frequency with which this murmur is heard, and its fitful character, leads to the supposition that it will be present in every case at one time or another during the course of pregnancy.

**III. Indications.**—When the murmur is continuous a causé should be looked for. Apart from the suspicion of winding of the cord round the child's neck, it has little practical bearing on the management of labour. Where the suspicion of this is present, numerous examinations with the stethoscope should be resorted to, and any change in the fœtal heart sounds, in the way of excessive diminution, loss of intensity or irregularity, is an indication for interference on behalf of the child. In such cases delivery with the forceps should be more rapid than usual. As soon as the head is born and the neck within reach the cord should be sought for.

That firm pressure on the funis does not cause this murmur is probably because it is too effective, and by interfering with the blood supply of the heart prevents it from displaying its usual energy, as is evidenced by the diminution in the frequency of its pulsations.

## C. FŒTAL MOVEMENTS.

It was during the search for these sounds that Mayor discovered the fœtal heart sounds. They are to be heard a little earlier [1] in the course of pregnancy than those due to the fœtal heart. They become more evident about the fourth month, and are of much value in the diagnosis of pregnancy and of the life of the child. Intestinal sounds sometimes simulate them.

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[1] Nägele, *loc. cit.*, p. 18.

When the movement is confined to an individual limb, the impression conveyed to the ear differs considerably from that produced by a general movement of the fœtus. The former may be only a gentle friction sound or a more sudden tap, while the latter gives the impression of extreme violence and turmoil within the uterus, due to multiplication of thumps from, and friction between, the various moving parts. The movements may be rhythmic in character, but are quite distinct from those of the fœtal heart. Meyer[1] has reported a case where he heard the jaw performing a series of movements for periods of a second, at the rate of from 250 to 300 per minute. After the birth of the child the "chittering" was continued, and led to the identification of the sounds heard antepartum. He remarks that these tremors are not due to cold, but to a nervous manifestation.

## D. UTERINE SOUFFLE.

Like so many other points connected with obstetric auscultation, this was first noted by Kergaradec. The uterine souffle, synchronous with the maternal pulse, is to be heard somewhat before the fœtal heart; according to Depaul, from the tenth week onwards. It reaches its maximum loudness about the seventh month, and is usually best heard on the left side, due, probably, to the right rotation of the uterus.[2] Griffith[3] thought that this theory would not explain the peculiarity; Herman[4] and Champneys[5] agree that a souffle of a higher pitch is more characteristic of the uterus than of a uterine tumour. The bruit is usually considered to be produced by the flow of blood through the large arteries coursing along the sides of the uterus in the broad ligaments (Depaul), and of this there can be no doubt, for in addition to being well heard, it is palpable as a thrill.[1]

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[1] Meyer, "Zwei zeltene Auskultations-Phänomene bei einer Schwangeren," *Centralb. f. Gynäk.*, 1897, No. 28, S. 904.

[2] Nägele, *loc. cit.*, p. 18.

[3] Griffith, *Lancet*, 1886, vol. ii., p. 123.

[4] Herman, *Lancet*, 1886, vol. ii., p. 123.

[5] Champneys, "The Uterine Bruit," *Lancet*, 1886, vol. ii., p. 123.

The murmur is present in almost every case, and is usually to be heard on both sides, though Champneys heard it on the right side alone in one case out of thirty-three. It can often be obliterated by pressure, but the sound itself is not due to the pressure of the stethoscope. It sounds close to the ear, and gives the impression of having a superficial origin as compared with the heart sounds. During a pain the souffle may vanish for even thirty seconds.[2] Kiwisch[3] says the murmur may be occasionally produced in the epigastric arteries, and in this Spiegelberg concurs.

Formerly various opinions were held regarding its ætiology. The discoverer thought the souffle was produced in the placenta. Nagle[4] has written a long article against this theory. Laennec and Carrière[5] assigned the murmur to the large arteries of the placenta, which, Depaul remarks, do not exist. Kennedy[6] affirmed that the sound depended on the utero-placental circulation, and that he had diagnosed pregnancy from this sign at the second month (*i.e.*, before the placenta is formed!). Jacquemier imagined it due to pressure on the pelvic arteries, while Hans and Bouilland

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[1] Rotter, "Ueber fühlbares Uteringeräusch," *Arch. f. Gynäk.*, Bd. v., S. 539.

[2] Martin, *loc. cit.*, p. 31.

[3] Spiegelberg, *loc. cit.*, p. 23.

[4] Nagle, *loc. cit.*, p. 97.

[5] From Depaul, *loc. cit.*, p. 88.

[6] Kennedy, *loc. cit.*, p. 99; "Obstetric Auscultation," *Lancet*, 1830, vol. i., p. 495; "Physiological and Practical Observations on the Utero-placental Circulation and the Phenomenon of the Placental Soufflet, with its Utility in Detecting the Existence of Pregnancy and the Death of the Fœtus *in Utero*," *Dublin Hospital Reports*, 1830, vol. v., p. 231.

(Depaul) adopt the view that the murmur is in the aorta or iliac vessels. Martin[1] combats this view, and with others brings forward the fact that placing the woman in the genu-pectoral position increases the sound.

Death of the fœtus has little influence on it, and it may be heard after the birth of the fœtus and the placenta. It is a sign of pregnancy of much value, being most frequently a sequence of conception. Otherwise, for practical purposes, it is of little importance.

## E. MUSCULAR SUSURRUS.

This is due to the contraction of the uterus, and is a muscle sound. The vibrations of the contracting muscle are so rapid as to give rise to an almost continuous hum. Braxton Hicks[2] has published a case where the vibrations of the recti abdominis were so slow that they were mistaken for very rapid fœtal heart sounds, being quite countable at 180 per minute. This occurs in these muscles during protracted labour when they are in a "state of half suspension".

## F. GAS IN THE UTERUS.

Harvey[3] gives notes of a case where he heard a distinct rustling sound everywhere over the upper part of the uterine tumour. This, he remarks, was first referred to by Stoltz as due to decomposition of the liquor amnii with the production of gas. In Harvey's case the child was decomposing.

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[1] Martin, *loc. cit.*, p. 31.

[2] Hicks, "Note on the Muscular Susurrus in Relation to the Fœtal Heart Sounds," *Transactions of the London Obstetrical Society*, vol. xv., p. 187.

[3] Harvey, "Note on an Acoustic Sign Heard after Death of the Fœtus," *Transactions of the London Obstetrical Society*, vol. xxi., p. 273.

## G. PLACENTAL SEPARATION BRUIT.

Caillant[1] has drawn attention to a sound heard on separation of the placenta. A vibratile sensation of tearing is sometimes perceived when the hand is controlling the fundus after the expulsion of the child, and while the placenta is separating. Doubtless, were one listening at the moment, a sound corresponding to the fremitus would be heard, as crepitation in fracture, besides being palpable, is also an auscultatory sound. If such always exists, it is only of secondary importance.

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[1] From Depaul, *loc. cit.*, p. 88.

# CHAPTER XV.

## DIAGNOSIS OF PRESENTATION.

CRANIAL PRESENTATIONS: Diagnosed by—

- I. Recognition of the Head from—
  - 1. Consistence.
  - 2. Conformation.
  - 3. Mobility.
  - 4. Position and Relationship to other Fœtal Parts; when (1) Above the Brim: (*a*) Before the Onset of Labour; (*b*) After the Onset (then Abnormal). (2) Entering the Pelvis: (*a*) Before the Onset of Labour, Apparent Fixation; (*b*) After Onset, Real Fixation, Presentation Permanent, except in Large Pelves. (3) Sunk in the Pelvis, Labour.
- Difficulties in Recognising the Head:—
  - 1. Conditions in the Abdominal Walls: (*a*) Straining, (*b*) Obesity, (*c*) Œdema, (*d*) Tenderness, Hyperæsthesia.
  - 2. Distention of the Bladder.
  - 3. Descent of the Head.
  - 4. Prematurity of the Fœtus.
  - 5. Maceration of the Fœtal Skull.
  - 6. Hydrocephalus, Meningocele, etc.
  - 7. Head Masked by Contraction of Uterus, Placenta, Twin, Tumour.
- II. Recognition of the Breech in the Fundus.
- III. Recognition of the Back.
- IV. Recognition of the Limbs.
- V. Location of the Area of Maximum Intensity of the Fœtal Heart Sounds.

## CRANIAL.

THE foregoing table, summarising this chapter, presupposes the presence of the head in the lower uterine segment; and being there its various signs should be looked for. Following the method of Pinard, already described (see p. 50), it is usually easy to allocate the case into one of the three classes:—

1. Pelvic cavity full.
2. Pelvic cavity partly occupied.
3. Pelvic cavity empty.

I. Where the pelvic cavity is occupied by the cephalic extremity. This pole of the fœtus may be known by its various characteristics, which may be classified under the following four heads:—

1. *Consistence.*—In cranial presentation the part of the head which usually comes under observation is chiefly the vault of the skull; thus the resistant mass covering or filling the brim is found to be more or less uniformly hard; on one side is felt the brow or chin, and on the other the occiput: the brow is said to be the harder (Pinard).

On compression Fasbender[1] has found that the bones may be made to produce a parchment crackle; this is more likely to be elicited where the bones are thin as in hydrocephalus, or where the fœtus is macerating; if present, it distinguishes the head from the breech. Rissman[2] believes the sound often to be owing to the rubbing against each other of the edges of two bones, and he thinks the phenomenon should be called intra-uterine crepitation.

2. *Conformation.*—The perception of the rounded, evenly smooth surface of the head is characteristic and is furnished by no other part of the fœtus. In some cases the lower jaw may be definitely made out, while in a smaller proportion, the frontal

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[1] Fasbender, "Sicheres diagnostisches Zeichen für die Erkennung des Kopfes bei Steiss- und Schieflage in der Wahrnehmung der sogenannten pergamentartigen Beschaffenheit der Schädelknochen durch die Bauchdecken," *Monatsschrift für Geburtskunde*, Bd. xxxiii., S. 435.

[2] Rissmann, "Intra-uterine Krepitation am kindlichen Kopf," *Centralb. f. Gynäk.*, No. 21, 1901; *Münch. Med. Woch.*, No. 25, 1901.

margin of the orbit may be found forming the upper limit of the smooth convexity of the brow.

3. *Mobility.*—The amount of movement permitted to the head varies with the degree of fixation and descent. When the head lies above the brim, it may be very readily shifted to or from either side. This facility of movement possessed by the head is due first to the fact of its attachment to the body by the flexible neck, and secondly to its being a spherical structure which has not, as a rule, an exact relationship with the surrounding wall. The sign is to be observed best where the amount of liquor amnii is in excess. In disproportion between the size of the head and the pelvis, the movement is more passive and the head tends to remain in the position in which it is put. When situated in the lower uterine segment, the breech does not possess this character at all.

After the head has entered the pelvis, the movement is limited to an up and down one (what might be called apparent fixation); on further descent, fixation becomes real. (The difference between apparent and real fixation is one of degree only, and depends on the amount of force used to raise the head from the brim.)

4. The position of the head in relationship to other parts of the fœtus has given rise to some discussion, *e.g.*, whether it is the brow or chin which is felt opposite the occiput. Pinard says that flexion of the head on the breast is too marked to permit of palpation of the chin. Leopold [1] holds that the chin cannot be reached. In the frozen sections depicted by Barbour [2] and others the flexion of the head on the breast, in addition to the fact that the various fœtal parts are accommodated to each other, causes the arms to lie more or less over the chin. Müllerheim,[3] on the other hand, dissents from this

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[1] Leopold, *loc. cit.*, p. 3.

[2] Barbour, *Atlas of the Anatomy of Labour*, 1889.

[3] Müllerheim, *loc. cit.*, p. 3.

view, and affirms that the chin can readily be made out when the head is sunk into the pelvis and where it is not quite so much flexed as at first. There is no doubt that the chin can often be felt as Müllerheim states: the extreme ease with which the flexed arms may be displaced upwards from the face renders possible the perception of the chin by palpation. Pawlik[1] agrees with Müllerheim that the chin is palpable.

The character of the passive movement of a fœtal part in relationship to a fœtal pole often enables the observer to differentiate between upper and lower extremity—thus, should a small fœtal part be felt beside the head, it will be observed that the joint about which it moves is situated remote from the head; while a limb lying beside the breech moves about a joint forming part of the breech.

A limb, such as an arm, when lying over the head, is very easily identified and as easily displaced.

Finding the narrow neck above the head, like the stalk of the plum, is another distinguishing feature in the recognition of the superior pole of the fœtus.

Occasionally when the cord lies round the neck or over the back of the child it is actually palpable; the inference that it is in that position may be drawn from the auscultatory signs which follow pressure on it when lying round the neck (see p. 94).

The various epochs at which the head has to be diagnosed are :—

(1) When it is above the brim.
(2) When it is entering the brim.
(3) When it is sunk into the pelvis.

(1) When above the brim: (*a*) before the onset of labour, the head may be so located without indicating any abnormality.

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[1] Pawlik, " Beitrag zur äusseren Untersuchung der Schwangeren," *Wiener Medizinische Blätter*, No. 21, 1891.

Where, however, it is so found in primiparæ, during the last month of gestation, some abnormality must be present to account for it.

In multiparæ the same rule does not apply; as Brühl[1] remarks, the more frequent the gestation, the less likely is the head to be descended into the pelvis.

(*b*) After the onset of labour, in all cases, the head should be sunk into the brim. If this is not so, one of the following conditions will be present:—

(i.) Disproportion between the size of the head and the brim.
(ii.) Malpresentation.
(iii.) Multiple pregnancy.
(iv.) Hydramnios.
(v.) Short umbilical cord.
(vi.) Placenta prævia.
(vii.) Prolapsed tumour, etc.

Thus the fact of finding the head above the brim during the last month in primiparæ; and, at least, after the onset of labour in multiparæ, enables one to say that the case is abnormal. Further, the various conditions permit of a more or less correct differential diagnosis from abdominal investigation alone.

According to Pinard, the head when above the brim in normal and abnormal cases always lies with its long axis in the transverse diameter.[2]

(2) When the head is entering the brim: (*a*) before the onset of labour. In primiparæ and in many multiparæ the head is usually entering the brim before the onset of labour, though it is more deeply sunk in the case of primiparæ. No matter at

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[1] Brühl, *loc. cit.*, p. 79.

[2] "The moment engagement begins the oblique diameter is occupied, except in contracted, or relatively contracted, pelves, where engagement takes place in the transverse; in such cases the head is not flexed so much as usual, and there may be an anterior or posterior obliquity present."

what period the head enters the pelvis, from that moment the presentation is permanent, and only in exceptional cases is there any change in this respect. In certain instances the head of the fœtus lies in the pelvis from the sixth to the eighth month, and rises out later on. In such cases the presentation is by no means fixed. Again, in exceptionally large pelves, the head may, even towards the end of gestation, rise out of the pelvis and may eventually occupy the fundus.

According to Schultze, Fasbender and Honing[1] change in the position of the presenting part takes place during the seventh to the eighth month in from 4 to 12 per cent. of primiparæ and in 23 per cent. of multiparæ. Two-thirds are alterations from one head position to another. Sutugin[2] says changes may occur at the end of gestation, or during labour, though uncommon in primiparæ. Valenta[3] remarks that change of position is more frequent in cases of contracted pelvis. The position may change naturally at any time, though even this, as a rule, does not happen except as part of the mechanism of labour.

Fixation at this stage is of importance, and it is often of moment to determine whether the head be immobile or not. Until, at least, the biparietal diameter has passed the brim the head cannot be said to be in any way fixed; for even after this the head may be readily lifted out by traction from the abdomen. A distinction can nearly always be drawn between the fixation of accommodation and that of labour. This has been previously referred to (see pp. 79, 81).

(*b*) The recognition of the head during labour, when it has descended into the cavity, demands some care in examination, and is frequently frustrated by the objections of the patient, who cannot endure the discomfort of deep palpation. When the head descends into the cavity its fixation becomes complete and a change in position will only take place in women who have exceptionally large pelves. In this situation only part of the head is available for observation.

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[1] From Mundé, *loc. cit.*, p. 4.

[2] Sutugin, from Mundé, *loc. cit.*, p. 23.

[3] Valenta, *loc. cit.*, p. 45.

(3) When the head is sunk well into the pelvis: this only takes place during labour. There is then often much difficulty in making out any of the characters of this pole of the fœtus; it is even difficult sometimes to say whether the presentation be cranial or not. The head may be virtually out of reach and the pelvic cavity be found *partly* full, a condition also found in breech presentation. It is therefore necessary to diagnose the presentation by other signs, such as the attitude accompanying the position. In some cases, however, though the brow is out of reach the chin is not. If the pointed resistance of the chin be found on one side, with the pelvis only partly filled, the diagnosis may be ventured after the rest of the uterus has been examined. The exploration of the interior of the pelvis is by far the most irksome part of the investigation to both examiner and gravidum. Without producing actual pain, a feeling of apprehension is engendered when the fingers are pressed into the cavity. This part of the investigation, being the most important, must nevertheless be thoroughly done. By a continuous, firm and gradual pressure, the examiner may satisfy himself as to the contents of the pelvis. It is to be observed in this connection that before beginning such an exploration the pubic crests and rami must be accurately located. Such a thorough palpation does not, unless unnecessarily rough, cause either the premature onset of pains or damage to the uterine walls.

The difficulties in the recognition of the head are:—

1. *Conditions in the Abdominal Walls.*—(*a*) Straining or simple excessive tenseness of the abdominal muscles renders abdominal palpation often quite abortive. In such cases, usually primiparæ, only that part of the uterus which is situated between the gaping recti muscles is available for palpation.

(*b*) Obesity, when extreme, masks all the characters of the pregnant uterus and its contents; when present at all, though to a less extent, it interferes greatly with the facility with which the examination can be carried out.

(*c*) Œdema is found, not infrequently, supra-pubically in pendulous abdomens and in cases where œdema is present elsewhere; to some extent it interferes with the identification of the smaller fœtal parts.

(*d*) Tenderness: where inflammatory conditions are not present, and where the case is otherwise normal, a certain amount of tenderness, which sometimes reaches to hyperalgesia and interferes with palpation, is largely imaginary; it has to be overcome by diplomacy, or the investigation abandoned. During pregnancy the appendix is sometimes the seat of tenderness; but more frequently the origin of the pain is in the ovary or the bladder.

2. *Distention of the bladder* most often masks only the lower uterine segment, but occasionally a more extreme state arises. Croft has reported a case where the entire uterus was covered by the enormous bladder (see p. 65).

3. *Descent of the head* makes the diagnosis difficult, and this in proportion to the completeness of the envelopment of the head by the bony pelvis.

4. *Prematurity of the Fœtus.*—When the cephalic extremity of the fœtus presents, the diagnostic characters of the head are wanting, and indeed the breech approximates more to the degree of denseness expected in the head. Before the fifth month the perception of the different fœtal parts is impossible (Mundé).

5. *Maceration of the skull* will vitiate the examination; but the state of affairs may be suspected from other evidence. The parchment sensation, furnished by the bones of the skull, may be elicited, or a distinct crepitation, owing to the separation of the individual bones, may also be observed. In such cases the question of presentation has little importance.

6. *Hydrocephalus, Meningocele, etc.*—Hydrocephalus gives rise to a very distinct set of symptoms; but its presence, as also that of other conditions, will sometimes render the recognition of the head difficult.

7. *The Uterine States Obscuring the Head.*—(*a*) The presence of a uterine contraction prohibits further search for the head.

(*b*) The placenta, though attached to the anterior aspect of the lower uterine segment, may not give rise to hæmorrhage; but its presence in front of the head will mask it more than the bladder and be more puzzling. If it interferes with engagement its presence will be suspected; otherwise the diagnosis can only be made after very careful examination, supplemented by a process of exclusion. The low attachment of the placenta often merely delays the descent of the head. When the placenta is situated higher up, and anteriorly, it is more readily identified.

(*c*) Either pole of another fœtus, situated in the supra-pubic region, will prevent the recognition of the head already in the pelvis; but the other signs accompanying this condition make the case clear.

(*d*) A uterine tumour, anteriorly placed, might readily be mistaken for a fœtal head. There is no possibility of avoiding this error except by a detailed exploration.

II. Besides the evidence furnished by the head for the diagnosis of a cranial presentation, the student can look elsewhere for information to be gathered from exploration in a different region. The examination of the fundus yields no less reliable data. Here the presence of the breech, which can be recognised from the following circumstances, will present to the observer any missing link.

The characters of the breech (situated in the fundus) may be classified and studied, as were those of the cephalic extremity, under four heads:—

1. Consistence: this is not so uniform as that of the head,

and it is not so hard except when grasped in the bi-trochanteric diameter.

2. The conformation is also irregular, and where the conditions are favourable many details may be recognised as belonging to this pole of the fœtus.

3. The mobility: this is one of the distinguishing features of the breech; the breech, unlike the head, moves *en masse* with the body of the fœtus, and it gives to the hand of the examiner a sense of fixity. An approximation to the phenomenon of ballottement may be obtained by the breech in dorso-posterior positions, where the movement of the breech alone can be perceived. Where the liquor is in excess a freedom is allowed to the breech that may make a careless observer believe he is dealing with the head. After rupture of the membranes, and where the various parts of the fœtus have become moulded together, the diagnosis is progressively more difficult.

4. The relationship of the breech to other parts is also helpful in recognising it. The podalic extremity of the fœtus is usually situated to the right of the fundus, or in the median line. In close proximity to the breech is often to be felt one or both feet; especially are these parts to be made out when the hands of the *accoucheur* are able to envelop the fundus and pass under the margins of the ribs. Movements of fœtal parts take place through a centre, about the same level as the breech. The breech is directly continuous with the back, and there is no groove corresponding to the neck.

III. The recognition of the back, except in rare or special cases, is easy. It may be directly felt; or its position may be inferred from the estimation of the resistance furnished to the ulnar border of the hand, held longitudinally, moving across the abdomen; the side containing the back gives a more solid feeling than that containing liquor. Occasionally the back is separated from the anterior uterine wall by a layer of liquor, which readily yields to a little sustained pressure. Budin[1] has described a method whereby the back may be more readily recognised. The test consists in eliciting an arching of the fœtal back forwards, on attempting to approximate the two poles by pressure on the fundus. The sign, when present, has some value, as has also its absence; it is especially noticeable in cases where the abdominal parietes are lax and in uteri previous to term. Although Budin emphasises this sign as an aid to diagnosis, Müllerheim,[2] on the other hand, maintains that it is of little value; for in the majority of cases serious difficulty will only be experienced when the back of the fœtus is behind and out of reach. Nevertheless, as a means of locating the back, the attempt to elicit this sign should always be made.

When the placenta is interposed between the hand of the observer and the back of the child, it is next to impossible to get any definite information by searching in this locality.

The situation of the back, as an aid to the diagnosis of the position of the head, though corroborative evidence, is not absolutely diagnostic in itself, as may be recalled by a little consideration of the ability of the head to assume an independent position.

IV. The recognition of the various other fœtal parts, which occasionally are evident, helps to give a more finished and complete idea of the attitude and presentation. Of the various small parts, the feet are usually the most obtrusive, and this for the reason that active movements influence them most. Such active movements can be induced as required by a sudden gentle thrust applied to the body of the child.

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[1] Budin, "Note sur un procédé qui permet de mieux constater les caractères de la région dorsale du fœtus lorsqu'on pratique la palpation abdominale et de mieux entendre les bruits du cœur fœtal lorsqu'on pratique l'auscultation à la fin de la grossesse," *Le Progrès Médical*, 1881, No. 21, p. 397.

[2] Müllerheim, *loc. cit.*, p. 3.

The knees can sometimes be identified; but they are, as a rule, generally mixed up with the arms, which latter are less accessible on account of their accommodation attitude (Mundé).

The small parts occupy usually a position on the side opposite to the back, and are more accessible in dorso-posterior positions. They are usually next the placenta.[1]

Subserous myomata have to be differentiated from fœtal small parts; this point has been drawn attention to by Mundé and Schröder.

The shoulder is perhaps of more importance than the other small parts. Rivière[2] has claimed that the position of the head can be diagnosed from the location of the shoulder; but if the back is not an infallible guide to the position, much less will the shoulder be—an opinion shared by Müllerheim.[3]

If, after palpation of the pubic rami, with the observer's back to the patient's face, the hands be pressed upwards and outwards by a gliding movement, very often the rounded prominence of the shoulder becomes evident as one or other hand mounts over the prominence.

In the absence of more definite information, a diagnosis might be made from the various signs considered collectively.

V. The location of the area of the maximum intensity of the fœtal heart sounds has been for long recognised as giving some sort of clue regarding presentation; but it is of only second-rate importance in the differentiation of position (see Auscultation, p. 97).

[1] Murdoch Cameron, *loc. cit.*, p. 31; Martin, *loc. cit.*, p. 31.

[2] Rivière, "Étude sur la valeur de la palpation de l'épaule," *Annal. de Gynéc.*, 1887 (1886), t. xxvi., p. 252.

[3] Müllerheim, *loc. cit.*, p. 3.

# CHAPTER XVI.

### DIFFERENTIATION OF VERTEX FROM BROW AND FACIAL.

Questionable if Brow or Facial Exist before Labour. After Labour—Head High or Free above the Brim—Long Axis of Head in Transverse Diameter of the Pelvis—Various Signs of Brow or Facial will be Present—Progress, if Present at all, is Slow—The Cause of the Abnormal Presentation may be Present—Signs of Vertex Presentation will be Absent.

(*a*) Head Sunk in the Pelvis.
(*b*) Occiput Lower than the Brow.
(*c*) Occiput Merges into the Neck without Deep Groove.
(*d*) Progress Proportionate to the Pains.

### DIFFERENTIATION OF THE VARIOUS VERTEX.

Difficult and Irksome. From Seat of Various Resistances :—

(*a*) Higher Resistance (Brow or Chin) on Right—a First or Fourth ;
,, ,, Posterior—a First ; Anterior—a Fourth.
(*b*) ,, ,, (Brow or Chin) on Left—a Second or Third ;
,, ,, Posterior—a Second ; Anterior—a Third.
(*c*) Where Higher Resistance is on One Side and Lower on the Other the Long Axis of the Head Occupies the Transverse Diameter of the Pelvis.

## DIFFERENTIATION OF VERTEX FROM BROW AND FACIAL.

Pinard asserts that before the onset of labour facial presentation does not exist. Schatz,[1] in enunciating his principle for the reduction of facial to vertex presentation, remarks that the manœuvre can be applied as well before labour as after it has begun, and Valenta[1] affirms that facial and brow cases occur more frequently during gestation than at labour. Pinard is most likely correct in the above assertion ; but whether he is or not, these two conditions can readily be made out by abdominal examination. (There are certain abnormalities which necessitate a presentation of the face, such as meningocele, dolico-cephalic skull, etc., for much the same reason as a snout presentation in the lower animals is usual. In such cases, no doubt, the face will present even before labour.)

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[1] Schatz, "Die Umwandlung von Gesichtslage zu Hinterhauptslage durch alleinigen äusseren Handgriff," *Archiv für Gynäkologie*, Bd. v., S. 306.

The following signs of facial or brow presentations will displace those accompanying vertex :—

1. The head either ballottes freely above the brim or engagement is very high (the sign of disproportion between the presenting area and the pelvic brim).

2. Most frequently the head rests with its long axis in the transverse diameter of the pelvis (this is the position during labour).

3. The various specific characters of these presentations will be present (see p. 131).

4. Progress, if present at all, will be slow in proportion to the pains ; though these be good, advance is slow or imperceptible.

5. The cause of the abnormal presentation may be evident, as, for instance, the presence of a contracted pelvis.

6. On the other hand the usual signs of vertex presentation will be absent ; such as :—

(*a*) The head being sunk into the brim.
(*b*) The occiput being lower than the brow.
(*c*) The occiput merging into the neck and back without the interposition of a deep groove or fissure.
(*d*) Progress being proportionate to the strength of the pains, etc.

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[1] Valenta, *loc. cit.*, p. 45.

## DIFFERENTIATION OF THE VARIOUS VERTEX POSITIONS.

This achievement is often most difficult and the attempt to accomplish it is usually annoying to the patient, as the lower uterine segment has to be minutely and carefully palpated to identify the various features of the head, from the position of which the diagnosis is made.

In the majority of cases anterior and posterior positions may be distinguished. The chief difficulty is found in diagnosing between the first and the third, and between the second and the fourth.

The examination should be carried out in such a way as to elicit the following features, and after the following plan. On either side of the suprapubic region, at different levels, is to be felt a resistant surface, and according as the areas of resistance are situated right or left, anterior or posterior, so are the positions differentiated from each other thus:—

(*a*) If the seat of the higher resistance be situated on the right, then the position is either a first or a fourth; if the right-sided resistance be placed posteriorly then the position is a first and if placed anteriorly then it is a fourth.

(*b*) If the higher resistance be situated on the left side then the position is either a second or a third; if the left-sided resistance be placed posteriorly then the position is a second, but if placed anteriorly then the position is a third.

(*c*) If the higher resistance be situated on one side and the lower symmetrically opposite, then the long axis of the head occupies the transverse diameter of the pelvis.

(If the head be found symmetrically placed, its long diameter will be in the conjugate and labour will have been in progress some time, or the pelvis tends to conform to the type of a Roberts' deformity, in which case engagement will not have taken place and the other signs of contracted pelvis will be present.)

In a FIRST POSITION the following features serve for identification :—

1. The easiest part reached is the occiput, which is situated just above the left pubic ramus, or more medianly according to the degree of descent, for as the head descends it tends to rotate into the conjugate.

2. To feel the posterior resistance of the brow, the right iliac region has to be depressed and the fingers sunk deeply in order to follow up that part of the cephalic extremity which lies deep; the fingers are then further from the middle line on that side (the right). The brow or the chin is also observed to be at a higher level than the anterior resistance (see fig. 5, p. 51). It is this feature which differentiates the first from the third position. (In the third the anterior resistance is higher than the posterior.) The amount of the disproportion between the levels of the occiput and the brow or the chin varies greatly and depends on the resistance to the downward progress of the head.

3. The back is situated towards the left; but often medianly, in which case its location gives no help in the differentiation of position.

4. In the right hypochrondriac region is usually to be found the breech.

5. The limbs are more or less obscured by the back; often one foot—the left, sometimes both—is to be felt situated on the right side of the breech. The shoulder is not far from the middle line and is usually on the right of it.

6. In the left lower umbilical or iliac region are to be heard the fœtal heart sounds. If the shoulders are engaging the sounds are distinct over the entire suprapubic region.

In THIRD POSITIONS, which are difficult to differentiate from first, the following points are to be noted :—

1. On the left the fingers are hindered from descending into the pelvis by the brow, as they are in the first position by the occiput.

2. This eminence (the brow) is not continuous with the neck and back; but can be traced upwards to the chin on displacement of the arms.

According to Müllerheim,[1] it is impossible to say whether the brow is directed anteriorly or posteriorly, because it has the same uniform surface all round. When the chin, however, is reached, there is more evidence to go upon. It must be admitted that unless the difference in level between brow and occiput be very marked, the diagnosis cannot be certain. The chin may be recognised as forming a hard border, beyond which the fingers dip into the space or fissure between it and the breast, and which is more evident in occiput posterior than in anterior positions, because in the former the amount of flexion of the head on the breast is not so complete.

3. The difference in level between the resisting areas on either side has been referred to already, and it is of much importance. The higher resistant area in R.O.P. is anterior and to the left of, though near, the middle line; whereas in L.O.A. the higher is posterior and to the right, while being at the same time farther from the middle line.

4. Either the back cannot be felt or it lies in the right flank (while in the first position it is anterior and towards the left).

5. The breech is more readily identified, and in these cases, especially if there be much liquor, ballottement may be present. Depression of the breech towards the head (Budin's method) does not produce a forward bulging of the body of the uterus. The breech most commonly lies in the right hypochondriac region (as in first position) or in the middle line.

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[1] Müllerheim, *loc. cit.*, p. 3.

6. If movements are very marked, the limbs seem to be everywhere; they lie on the side opposite the back, *i.e.*, the left. The elbows and knees both constitute prominent landmarks; the direction in which they move may permit of the location of their attachments—above or below. Towards the right, but further from the middle line than in L.O.A. positions, is to be found the shoulder.

7. On auscultation the heart sounds are transmitted through the limbs — usually fainter than when transmitted directly through the back—though not always so. Frequently the sounds are to be heard most distinctly in the right flank, and the distribution of the sounds may be very wide.

Contrasting the two positions—first and third—it will be observed that while the characters of the head are, for differential purposes, less easy of identification in the third position, those of the shoulder, back, limbs and fœtal heart are more readily differentiated. (It may be remembered also that the third position is somewhat uncommon.)

In SECOND POSITIONS the characteristics are the same as in the first, only reading left for right; the breech is either towards the left or is situated in the middle line. According to Pinard this is a rare position during pregnancy; being one rather of labour. As a primary position of labour, however, it is a much commoner position than is admitted in the text-books: it is generally supposed to be produced from the third by rotation, if so, the rotation takes place unusually early in the course of labour.

The FOURTH POSITION gives much the same characters as the third, reading left for right.

On account of the frequent right lateral rotation and flexion of the uterus, the body of the fœtus, and especially the breech, comes to lie more towards the anterior part of the left flank. On account, too, of the concomitant right rotation the child may assume a somewhat spiral attitude; the breech being to the right with the sacrum anterior; the back laterally placed on the left and the chin pointing forwards, while being situated on the right.

It will thus be noted that besides the first position resembling, in some degree, the third, it resembles the fourth on account of the flexion and rotation of the uterus which are often present.

# CHAPTER XVII.

## TRANSVERSE POSITIONS OF THE HEAD.

Normal before Labour — In Facial and Brow Presentations — Lateral Flexions Usually Accompany It—Obliquity of Nägele and Litzmann —In Anteversion and Contracted Pelvis—Manner of Production.

## BROW AND FACIAL PRESENTATIONS.

Really Varieties of Position.—Diagnosis of Brow :—

1. Engagement only Apparent ;
2. Occiput and Chin are on the same Level ;
3. Long Axis of the Head in the Transverse ;
4. Labour does not Progress ;
5. Position of Rest of Fœtus Non-characteristic.

Diagnosis of Facial :—

1. Engagement High and Progress Slow ;
2. The Occiput Lies towards One Side and is Prominent ;
3. A Deep Groove Separates it from the Back and Neck ;
4. The Characters of the Chin are Diagnostic ;
5. Both Breech and Occiput are on the same Side ;
6. Back is Hyperextended ;
7. Position of the Limbs is Anomalous ;
8. The Fœtal Heart is Heard on the same Side as the Limbs ;
9. A Palpable Cause may be Found ;
10. Long Axis of the Face Lies in the Transverse Diameter of the Pelvis.

## TRANSVERSE POSITIONS OF THE HEAD.

Before the onset of labour, according to Pinard, the head always lies above the brim in the transverse diameter. After the onset of labour there is some abnormality present if the head continues to occupy this diameter.

In presentation of the face or brow the long axis of the presenting surface tends to lie across the brim (Lusk); this being probably due to the disproportion between the dimensions of the entering part and the brim. It is one of the refinements of palpation to be able to discover the position of the head as it rests above the brim of the pelvis; this can be done both as regards rotation and flexion.[1]

As a usual accompaniment of the transverse position, lateral flexions of the head may be looked for, and these in many cases are quite possible of recognition.

The vertex may be tilted backwards, producing the lateral obliquity of Nägele, who first drew attention to the phenomenon; this observer regarded it as abnormal. Leishman [2] held strongly that it was not a usual accompaniment of normal delivery. He is supported in this view by Olshausen and Veit in *Schröder's Lehrbuch*, 1893. Barnes [3] writes: "Nägele's obliquity is a real and nearly constant phenomenon in natural labour". Galabin [4] agrees with Barnes that the head enters the brim with some lateral obliquity in normal cases. The following quotation is taken from his writings: "Whenever the head is so shaped that lateral obliquity secures a mechanical advantage by bringing a smaller diameter of the head into the apposed diameter of the pelvis and when also the head is subjected to lateral pressure the effect of the pressure is to bring about such a lateral obliquity".

According to Seigneux,[5] Fritsch was the first to consider the obliquity normal. Ahlfeld, Kaltenbach, Wiener and Winckel all agree with this view (Seigneux).

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[1] Sandberg, *loc. cit.*, p. 83.

[2] Leishman, *loc. cit.*, p. 20.

[3] Barnes, "On the Mechanism of Labour, More Especially with Reference to Nägele's Obliquity and the Influence of the Lumbo-Sacral Curve," *Trans. of the London Obstet. Soc.*, vol. xxv., p. 258.

[4] Galabin, "The Causation of Lateral Obliquity of the Fœtal Head," *Trans. of the London Obstet. Soc.*, vol. xxv., p. 252.

[5] Seigneux, "De la présentation de la tête, et de mecanisme de son engagement," *Revue Méd. de la Suisse Romande*, Juin, 1896; Hegar's *Beiträge zur Geburtshülfe und Gynäk.*, Bd. iv., H. 3, Leipzig; "Ueber die Neigung der Uterusachse am Ende der Schwangerschaft und die Kopf Einstellung," *Münchener Medicinische Wochenschrift*, 1901, No. 26.

The obliquity of Nagele may be produced in otherwise normal cases by anteflexion of the uterus consequent on a pendulous abdomen.

In cases of contracted pelvis it is admitted by all that the head enters the brim in a laterally oblique position. Pinard contrasts the conditions accompanying anteversion of the uterus with contracted pelvis. In anteversion the following are concomitant :—

1. Anteversion—
    (*a*) The fundus is low ;
    (*b*) No fœtal limbs are to be observed in the fundus ;
    (*c*) The breech lies in one or other iliac fossa, at the level of the forehead (the back curving round the upper part of the uterine cavity) ;
    (*d*) The head is usually more or less engaged.

In contracted pelvis, on the other hand, the state of affairs is different, thus :—

2. Contracted pelvis—
    (*a*) The fundus is high ;
    (*b*) The head is not engaged ;
    (*c*) The breech is, as usual, in the fundus ;
    (*d*) The back is laterally placed.

The posterior or Litzmann's obliquity in which the sagittal suture is displaced towards the symphysis, and the posterior parietal bone presents, occurs in normal cases also. Its occurrence, therefore, is not to be regarded as a bad omen. It may be due to an abnormality or exaggeration in the inclination of the pelvis, and to the requirements of accommodation in certain attitudes of the fœtus. Seigneux, who has given much attention to this subject, supports the above statement that posterior obliquity is neither abnormal nor of bad omen. He further states that posterior obliquity is more frequent in primiparæ ;

that in multiparæ the anterior is the commoner, and that it is not influenced by the size of the pelvis at all. This may be explained by the fact that in primiparæ there is less anteflexion of the uterus (the abdomen being less pendulous), so that the child's head, if remaining in a normal relationship with its trunk, would tend to rest upon its sagittal suture on the symphysis, with the posterior parietal bone presenting. Schatz[1] writes: "The obliquity of Litzmann can neither be properly explained nor understood unless the converse obliquity of Nägele be first understood. Both are, indeed, though in a less degree, often enough to be observed when the pelvis is normal; but they are to be met with in a marked form only with deformed pelvis, and, indeed, most frequently in connection with the flat pelvis."

He divides the obliquities into primary, occurring during gestation, and secondary, occurring during labour. Thus, with a pendulous abdomen, the sagittal suture comes to lie nearer the promontory, so producing a primary obliquity of Nägele. With a contracted pelvis, however, as the posterior segment of the vertex is more extensive than the posterior half of the conjugate diameter, a primary Litzmann's obliquity is produced.

During labour the axis of the uterus becomes bent forwards, especially in the region of the lower segment. The body of the child follows suit, so that the sagittal suture, which formerly lay across the anterior segment of the brim, becomes by this tilting of the head situated in the posterior segment and produces a secondary obliquity of Nägele in place of the previous primary obliquity of Litzmann. This is what most frequently happens.

Should the change in the uterine and fœtal axes not occur, then the obliquity of Nägele will not take place, but the secondary obliquity of Litzmann will succeed the primary.

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[1] Schatz, "Ueber die Hinterscheitelbeinlagen," *Münchener Medicinische Wochenschrift*, 1901, No. 41, S. 1626.

## PRESENTATION OF THE BROW AND FACE.

It is more convenient to consider these presentations under the head of positions; for the same characteristics, which differentiate the various positions of vertex presentation, guide us in the diagnosis of brow or facial *positions of the head* as they might preferably be called.

Though the ætiology of brow and facial presentations is perhaps different in essence, the physical features merely show the one to be a more advanced stage of abnormality than the other.

The diagnosis of BROW may be made from the following data:—

1. Engagement (which is only apparent if the head be mature) is high.

2. Both occiput and chin, being easily discernible on account of their position, are on the same level.

3. The long axis of the head lies in the transverse pelvic diameter, thus really making only two primary positions; or four varieties may have to be diagnosed from each other, as in vertex positions. The chin is more apparent than usual.

4. Irrespective of the expellent forces, there is no progress.

5. The position of the other fœtal parts is non-characteristic.

The diagnosis of FACIAL positions rests upon the identification of a number of leading signs, such as are enumerated in the following list:—

1. Engagement is high and progress slow.

2. The highly placed occiput, which is a very prominent object in the lower uterine segment, lies towards one or other side.

3. A deep groove separates the neck from the occiput.

4. The characters of the chin, in its peculiar position, are said to be diagnostic. In one side of the pelvis the inferior border of the chin forms a horseshoe-like rim which dips into the cavity.

5. Both breech and occiput are to be found on the same side (Pinard).

6. The back is hyperextended; this follows as a sequence of the extension of the head.

7. On account of the exigencies of accommodation, the limbs may be situated on both sides of the trunk, or be pressed against the anterior part of the uterus; they are very accessible in back posterior and the reverse in back anterior positions.

8. The fœtal heart sounds are best heard on the same side as the limbs, and pulsations of the fœtal heart have been directly palpable (see Auscultation, p. 98). In back anterior positions the sounds are not readily heard (Leopold and Sporlin).

9. An ætiological primary abnormality may be self-evident, and may induce a suspicion of the condition.

10. The long axis of the face usually lies in the transverse diameter of the brim, though the various positions, corresponding to those of the vertex, may require to be classified.

# CHAPTER XVIII.

## DIAGNOSIS OF BREECH PRESENTATIONS.

I. Signs of Breech in Lower Uterine Segment.
  Question of Descent and Position of Breech.
  High Position of the Fundus.
  Characters of the Breech.
II. Recognition of the Head in the Fundus.
  Characters of the Head.
  Tenderness over the Head.
III. The Position of the Back.
IV. The Position of the Limbs.
V. The Localisation of the Heart Sounds.
VI. The Cause of the Divergence from the Normal.

## TRANSVERSE PRESENTATION.

Oblique or Symmetrical Transverse (Latter Rare).
Signs of: Asymmetrical Uterus—Palpation Signs of Head—Breech, Auscultation Signs.
Difficult to Diagnose when Impacted.

## DIAGNOSIS OF BREECH PRESENTATIONS.

In the diagnosis of breech presentations the same method may be applied as is employed in the diagnosis of vertex. This is carried out in the following way:—

I. *Recognition of the Breech instead of the Head in the Lower Uterine Segment.*—Unlike the head the breech does not descend into the pelvis before the onset of labour. It is therefore before the onset of labour when the breech and the head are both available for examination that the diagnosis can be most readily made.

When the breech enters the pelvis, the brim becomes choked by the after-coming trunk, plus the lower extremities, whereas in head presentations the head is not out of reach till the brim becomes filled by the engaging shoulders. In such cases where the breech is out of reach, the diagnosis rests on the recognition of the characters of the head, as found in the fundus. In a vertex presentation, where the head is out of reach from the abdomen, labour must have been in progress some time and the os must be fully dilated. The progress in a breech case is somewhat less marked than in a vertex presentation, so that the rate of descent of the presenting part has some bearing on the situation. The fact, however, of the breech ceasing to be palpable after it has entered the pelvis, and of progress being slower, tends to lessen the importance of this point; for though the presenting head descends more rapidly than the breech it has further to descend before getting out of reach, whereas though the breech travels more slowly it sooner gets beyond palpation. It may also be noted that the fundus is high and the uterus may be inclined towards the left.

The breech may be identified in the lower uterine segment from the following features:—

1. The breech is less hard than the head and forms a much more bulky mass. The mass has also a varying consistence, hard at one spot; soft at another.

2. Its conformation is less even; its definition more vague.

3. Its mobility is not of such nicety, the trunk and breech moving *en masse*, so that there is no true ballottement.

4. The position of the breech is asymmetrical, the breech covering one segment of the brim while the limbs usually extend over the other—this also giving rise to the difference in consistence observable in the podalic extremity, apart from the variability in the consistence of the breech itself.

5. Where the back is posterior, just as in vertex presenta-

tions, the limbs are more in evidence, while when the back is anterior the limbs are seldom within reach at all. Schröder[1] says that when the breech and the back are on the same side the presentation is likely to be a footling. Where the back is on the side opposite to the breech the sacrum will present.

II. *Recognition of the Head in the Fundus.*—All the characters of the head ascertainable while it occupies the lower segment can be almost as readily identified when it lies in the fundus; sometimes sections of the cephalic extremity are even more easily palpable. The hardness, evenness, mobility (ballottement) and the groove of the neck make its presence certain. Occasionally there is an unnatural sensitiveness of the uterine wall over the region of the head (Budin, from Spencer).[2] Not infrequently, in back anterior positions, the head is situated deeply, and in order to demonstrate its signs it must be brought into a more suitable position. That this can be accomplished without moving the trunk is noticeable. When the back is posterior the head can hardly escape observation. Sometimes a hand rests on or over the head, and the breech is simulated; the hand or arm can, however, be very easily displaced.

III. The back shows the same signs as in head presentations. Its location is, however, of more value in diagnosing the position of the breech relative to the pelvis than is the case in vertex presentations.

IV. *The Recognition of the Limbs.*—These form part of the presenting pole. They are situated a little above the breech, and on passive movement the point about which they move is observed to be at a lower level than themselves. Their identification is useful in the diagnosis of breech cases; where they are not readily discoverable their movements, voluntary or induced, reveal their situation.

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[1] Schröder, *loc. cit.*, p. 5.

[2] Spencer, "The Dangers and Diagnosis of Breech Presentation, and Its Treatment by External Version towards the End of Pregnancy." *British Medical Journal*, 1901, vol. i., p. 1192.

V. The localisation of the heart sounds adds a probable sign to the diagnosis. The sounds when transmitted through the skull are thus perceptible much above the umbilicus. Where this sign is present the significance of the observation is enhanced.

The cause of these presentations, especially in primiparæ, should always be most carefully sought for, as prophylactic version should be performed where possible, unless in certain cases of deformed pelvis and low attachment of the placenta, where presentation of the breech may be favourable rather than otherwise (see Version, p. 162). During the first part of the second half of gestation the position of the fœtus is a variable one, and it is unnecessary to label the case as one of breech presentation and to attempt to rectify it. It is only in such cases where there is little liquor and the presentation is tending to become fixed that treatment is called for.

## TRANSVERSE PRESENTATIONS.

Of all the presentations transverse are the most easily recognised on abdominal examination. Pinard[1] has remarked that where the pelvis is found empty the iliac fossæ should then be palpated, for the head usually lies there in these presentations. A perfectly symmetrical transverse, the same author finds, is very rare, the oblique variety being that most commonly met with. A presentation with the breech in either iliac fossa seldom has the axis of the child oblique enough to require its inclusion as a transverse presentation; for in an ordinary breech case the breech very frequently rests in one iliac fossa while the limbs occupy the other.

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[1] Pinard, *loc. cit.*, p. 4.

The signs which show the presence of such an abnormality are :—

1. The uterus is visibly asymmetrical, being broader and less elevated than normally.

2. Palpation corroborates these signs, and demonstrates the position of the head to be in either iliac fossa (oblique), or in either flank (transverse). As both head and breech are available for palpation in their entirety the contrast is marked, and each can be definitely identified. The leading characteristics are usually prominent ; the trunk connecting the head and breech is readily enough discoverable, curving along the free iliac fossa. The application of the manœuvre of Budin,[1] which consists in approximating the two fœtal poles, and thereby making the back more prominent, will aid in the identification of this part of the fœtus. Either above or below the body of the fœtus are to be found the limbs.

3. The auscultation signs are not definite enough to lay any stress upon ; the sounds are loudest towards the head ; they may be better heard over the region of the back after bringing it more prominently forward by Budin's plan.

After rupture of the membranes, and when these presentations become impacted, palpation is disappointing, for the various parts of the fœtus become moulded together.

Oblique cases are usually accompanied by other abnormalities, which occasion these anomalies in the position of the child, and which are often as apparent to palpation.

A transverse position of the child during the beginning of the latter half of pregnancy is fortuitous, and has no bearing on the prognosis. Where, however, the child remains in that position an attempt should be made to rectify the presentation at the end of the eighth month and to maintain it so.

Complicated presentations, such as presentation of the head with a hand, will have their presence indicated by the high position of the head, for engagement will either be interfered with or it will be high, in either of which cases the abnormality will be evident on palpation.

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[1] Budin, *loc. cit.*, p. 118.

Head presentation complicated by presentation of the cord will give no sign of its presence till pressure becomes applied to the cord when labour begins. Interference with the cord of such gravity will in every case produce evident auscultatory signs. A diagnosis before the onset of labour is theoretically possible by forcing the head downwards into the pelvis, while auscultating at the same time for the fœtal heart sounds. If the circulation in the cord is thereby interfered with, slowing of the heart will result or a funic souffle will be produced. A vaginal examination is rarely performed before the onset of labour, so that the early recognition of the condition is entirely dependent on a careful examination of the abdomen (see Auscultation, p. 103).

# CHAPTER XIX.

Hydrocephalus: Head Found on Palpation, Free, Elastic, Parchment Crackle, Large—Gives Rise to Malpresentations—Auscultatory Signs—Fallacies.

Rupture of the Uterus: Premonitory Signs—Evidences of—Uterus to One Side and Dead Fœtus to the Other with Intestine between—Surgical Emphysema.

## HYDROCEPHALUS.

Hydrocephalus is one of the conditions which prevent engagement; though it is comparatively rare, still it is of the utmost importance to detect it early.

In the vast majority of cases the head does not engage, but remains free above the brim.

Swayne[1] has reported a number of cases where the head descended into the pelvis, but could not be delivered. He also thinks that the diagnosis is difficult.

By palpation during pregnancy and labour this condition can be recognised by the following signs:—

1. The increase in the size of the head is readily ascertainable, especially in cranial presentations.

2. The abnormal consistence of the skull, though less noticeable in minor degrees, is a valuable aid to the diagnosis. The parchment crackle, described by Fasbender[2] as a sign of the normal skull, will be more likely to be elicited in this state.

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[1] Swayne, "Hydrocephalus as a Complication of Labour," *Trans. of the London Obstet. Soc.*, vol. xxix., p. 405.

[2] Fasbender, *loc. cit.*, p. 109.

In advanced disease a species of fluctuation can be perceived during palpation, the large round head being elastic.

3. Where the breech presents, especially in primiparæ, the possibility of hydrocephalus should always be entertained till the abnormality is excluded. In certain cases the hydrocephalic head may be deeply placed in the fundus and its presence overlooked. Delay in the delivery will not be met with till the after-coming head attempts to engage.

4. During auscultation if the head presents the area of maximum intensity of the fœtal heart sounds is more highly situated than usual; while if the breech presents the heart is heard best in a lower position than usual.

In Swayne's paper, already referred to, no method of external diagnosis is mentioned, but in the discussion following Herman pointed out that "external palpation was of great value in these cases," and drew attention to the value of finding the head unable to enter the pelvis, as showing the presence of a condition entailing difficult or impossible delivery.

The signs of a well-marked hydrocephalus are simulated by no other abnormality. On the other hand, when only a minor degree of this condition is present, the signs are the same as those furnished by deformed pelvis. An attempt must be made to distinguish them. Swayne rightly cautions against the forceps in those cases where the head is impacted. One example of an extreme type was seen by the writer. The patient was a primipara, and the breech had presented; the labour came to a standstill when the after-coming head should have engaged. By abdominal palpation, the cause of the dystocia was understood. A similar prognostication was suggested in another, owing to the presence of a large suprapubic swelling. Here, however, the apparent hydrocephalus was due to an abnormally large and fleshy placenta, and the dystocia to a minor degree of contracted pelvis. The placenta wrapping round the head gave the erroneous impression of a hydrocephalus. This possibility should be borne in mind. In a primipara a minor state of this abnormality was evident one month before term, on account of the non-descent of the head, the increase in size of which permitted of accurate measurement. In such minor differences in the relationship between the size of the head and the capacity of the canal some attempt ought to be made to estimate the amount before treatment is decided upon.

## RUPTURE OF THE UTERUS.

The suspicion of this having occurred will be aroused by the various symptoms, and by the appearance of the patient with her history.

The examination of the abdomen is of great importance in helping towards a diagnosis. The information elicited on palpation helps one to formulate an opinion regarding the proper treatment, and to give a prognosis.

Where the rupture is confined to the lower uterine segment, no evidences will be produced abdominally, and only when the body of the uterus is completely ruptured will physical signs be present on abdominal examination. In certain cases where the child has been delivered, there may be much difficulty in arriving at a diagnosis at all. Occasionally, even in extensive ruptures, there may be no evidence, other than perhaps collapse, to show that a serious accident has occurred.

Rupture of the uterus usually takes place before the passage of the child has been accomplished, and according to Lusk[1] the child passes through the rent in the majority of cases. The tear is most frequently through the left side—the explanation generally accepted being that right flexion and rotation of the uterus are commoner, and that the head usually occupies the left iliac fossa.

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[1] Lusk, *loc. cit.*, p. 20.

During obstructed labour palpation of the abdomen sometimes gives valuable information, which might point to impending rupture of the uterus.

Smyly [1] writes as follows: "On palpation the contraction ring can easily be felt at or above the level of the umbilicus running obliquely across the abdomen. The part of the uterus above it is thick and firm, and the fœtal parts can scarcely be distinguished within it, whilst below it, on the contrary, they can be felt with unusual ease. The round ligaments stand out like firm cords, but only one can, as a rule, be felt. Where these symptoms are present the walls of the lower uterine segment are stretched to the bursting point, and any attempt at version would be attended with serious risk; indeed the mere introduction of the hand in addition to the body of the fœtus has determined the catastrophe."

When the child has passed through the rent into the abdomen the clinical picture is a well-defined one, and gives the following signs:—

1. The empty uterus is to be found displaced to one side—usually the right on account of the rent being on the left. The uterus under these circumstances forms an elongated tumour of indifferent hardness. Tenderness may or may not be present; it will depend largely on the amount of injury suffered by the tissues—especially the peritoneum, and the length of time elapsed since the accident.

2. On the side opposite to the uterus, free in whole or in part from the tear, is to be found the child, which is dead. The various fœtal parts are ominously distinct; indeed, the diagnosis of rupture of the uterus has been mistakenly made because of this circumstance.[2]

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[1] Smyly, "The Ingleby Lecture on the Lower Uterine Segment and the Contraction Ring," *Brit. Med. Journ.*, 1901, vol. i., p. 1189.

[2] Ashwell, *On Parturition*, p. 127.

3. A sulcus between the uterus and the child may be occupied by intestine. The intestine may even spread over part of the uterus, but more frequently over part of the fœtus. Under manipulation it is evident that the intestine and the fœtal surface are in intimate relationship. This is a sign of much value; for intestine never lies normally anterior to the uterus in the later months of gestation.

4. In exceptional circumstances, surgical emphysema may be present on the anterior or lateral aspect of the uterus (Lusk). This is more likely to take place in cases of incomplete rupture, where the peritoneum has been left intact.

# CHAPTER XX.

## CONTRACTED PELVIS.

In Minor Degrees after a Number of Confinements: Children Larger – Changes in the Uterus.

Inspection: Abdomen Pendulous—Visible Abnormality—Inclination of the Vulva Changed—Suprapubic Skin Œdematous, Eczematous.

Palpation: Abdominal Walls Tense—Uterus High—Round Ligaments Tense—Appendages Easily Made Out—Bandl's Ring—Malpresentations—Pelvic Cavity Empty—Head Free, Overhanging the Symphysis, Laterally Oblique, in Justo-minor Type Flexion Marked—Differential Diagnosis—Prognosis, from Condition of the Membranes, Site of the Placenta, Rise of Bandl's Ring, Position and Presentation of the Child—Measurements, Direct, Pinard's, Ahlfeld's.

## THE DIAGNOSIS OF DEFORMED PELVIS FROM EXAMINATION OF THE ABDOMEN.

Leopold and Spörlin have pointed out that it is easier to recognise contracted pelvis from an external than from an internal examination; in certain cases, chloroform is required before the deformity is felt from the vagina. Moreover, the existence of this misfortune in primiparæ can be determined by examination of the abdomen many weeks before term; while in multiparæ the history of former deliveries will indicate the presence of a divergence from the normal.

In minor degrees of contracted pelves, it is only after a series of labours have been more or less satisfactorily concluded that the pinch begins to be felt. This may be due to the following circumstances:—

1. The fœtal head tends to become larger and the individual bones more ossified with each successive gestation; in any

case, the chance of the entrance of the head into the brim becomes less and less with each pregnancy.[1]

2. In women with malformations of the pelvis the children appear to be larger than usual (Pinard). Wilke[2] in dissenting from this view asserts the opposite; for in contracted pelvis the duration of pregnancy is not lengthened, and, secondly, because in multiparæ the weight of the child increases.

3. The uterus after each pregnancy becomes less elastic; it is in such that spontaneous rupture is most likely to occur, so that the force necessary to expel the larger and heavier child, instead of being augmented, is diminished. In such cases the history will be misleading; but the abdominal investigation, both before and after labour has begun, will indicate that the head is relatively too large.

The probability of a deformed pelvis may sometimes be surmised from the appearance of the patient, or from her history; it is, however, during the examination of the abdomen that the suspicion may be changed to a certainty.

I. From inspection the following features are to be observed:—

1. In short women the abdomen is pendulous; for in them the only free direction of growth is forwards.

2. The abnormality of the bony pelvis may be quite visible.

3. In some the vulva may be changed in position, varying according to the inclination of the pelvis; thus in flat pelves it tends to look more forwards, while in spondylolisthetic it is directed downwards, or even slightly backwards.

4. Suprapubically, the skin is not infrequently œdematous, or even eczematous, on account of the overhanging belly forming a deep groove at that part.

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[1] Brühl, *loc. cit.*, p. 79.

[2] Wilke, "Das Geburtsgewicht der Kinder beim engen Becken," *Hegar's Beiträge zur Geburtshülfe und Gynäkologie*, Bd. iv., Heft 2, Leipzig; *Münchener Medicinische Wochenschrift*, 1901, No. 24.

5. A complication, such as a malpresentation, may cause the conformation of the uterus to appear peculiar.

II. By palpation the most important points are to be found :—

1. The abdominal walls are very tense in those whose uteri are not anteflexed.

2. In such also the fundus is abnormally high ; [1] and the uterus is deflected towards the left without being rotated (see p. 40).

3. The round ligaments, being tenser than usual, are more evident, especially where the fundus is high.

4. Where anteflexion is marked, the appendages are more easily identified.

5. During labour there is the formation of Bandl's ring, whose rate of ascent is inversely as the progress.

6. Contracted pelvis predisposes to malpresentations, especially the oblique variety of transverse.

7. Finding the pelvis empty, where in the course of events it should have been occupied, denotes the presence of some abnormality, among which contracted pelvis is the chief. In all cases after the onset of labour, the presenting part ought to be into the brim ; in primiparæ, with the exception of the breech (in natural presentations), the presenting part should have descended into the brim, from four to six weeks before term.

8. If the head is the pole which is attempting to enter the small pelvis, it will be found to move freely from side to side over the brim, having an unstable position when placed in the middle line, *i.e.*, the head rests on either side of the promontory. Where the brim is narrow or obliquely distorted, the range of movement may be curtailed. The head also rests with a large segment projecting over the symphysis : in craniotomy it is

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[1] Litzmann, *loc. cit.*, p. 80.

this segment which it is difficult to obliterate. The head, resting in the transverse diameter (in the common flat pelvis), has its anterior fontenelle lowest. This may be a sequence of the increased length of the uterus and *ipso facto* of the diminution in the state of flexion of the child. Lateral obliquities of the head are the rule, and the posterior, though less common than the anterior, is not infrequent. For some time after birth the child's head may retain the peculiar shape into which it has been forced by its prolonged retention in an oblique position.

9. In the justo-minor type of pelvis engagement is high and flexion is extreme. Thus the occiput is out of reach from the abdomen, while the chin is above the brim. On vaginal examination also, the vertex may be well descended while the chin is still palpable at the brim.

The various conditions which give signs similar to those of contracted pelvis are, however, possible of differentiation from it.

1. The causes of a high fundus are:—

(*a*) Twins.

(*b*) Hydramnios.

In both of these the uterus is increased in its transverse as well as in its vertical axis.

(*c*) Breech presentation.

(*d*) Deformed pelvis.

In the two latter the uterus is narrow, and deflected usually towards the left, which may be said to be abnormal. Both these conditions may co-exist, for a contracted pelvis may be the reason for the presentation of the breech.

2. When an oblique situation of the fœtus is found, malformation of the pelvic canal should be suspected after excluding the possibility of another fœtus being present.

3. Non-engagement of the head:—

Besides malformation of the pelvis, there are a number of other conditions which give rise to this sign.

(*a*) Hydramnios, with or without twins, has been treated of elsewhere (see p. 71).

(*b*) Short cord: the head in this instance descends with each pain, but it recedes during the interval (see Auscultation, p. 94).

(*c*) Hydrocephalus has been previously mentioned (see p. 139).

(*d*) Tough membranes rarely prevent *engagement* of the head, though they may hinder its descent.

(*e*) A prolapsed tumour displaces the uterus; where of sufficient size to prevent *engagement* it will be large enough to be perceived from the abdomen, as filling the pelvic canal.

(*f*) Placenta prævia is quite capable of interfering with the descent of the presenting part, but at that stage its usual symptoms will have become fully developed. If the placenta has been felt at the fundus, this reason for the non-descent of the head is excluded.

(*g*) Tumours arising from the pelvic canal are too rare to be more than mentioned.

The prognosis may be ascertained from abdominal exploration during the progress of a case complicated by deformed pelvis, from consideration of the following:—

1. In any given case it is nearly always possible to state whether the membranes be ruptured or not, after making a thorough abdominal examination of the gravid uterus; for from the decision on this point much guidance is obtained in forming an idea of the probable progress of labour. There can be no doubt that early rupture of the membranes, before dilatation of the cervix, cannot be recognised for certainty by vaginal examination, or by the story of there having been a gush of fluid. In certain cases the fact of there being no liquor left in the uterus would militate against Cæsarean section; while the same condition, in other cases, would contraindicate attempts at external version.

2. *The Influence of the Site of the Placenta.*—It is conceivable that the knowledge of the position of the placenta might weigh with one in the selection of the spot for incising the uterus during Cæsarean section. In attempting to turn, the knowledge of the placental site would make one avoid employing anything but the slightest force in that neighbourhood.

3. The rapidity of formation and the amount of rise of Bandl's ring form important elements in the question of treatment and of prognosis. Thus when the ring is very evident, attempts at version (external or internal) or expression would be highly improper.

4. For treatment and prognosis the attitude and position of the child have also some significance. Facial or brow presentations of the head would complicate the course of the confinement considerably, and would alter the treatment. In certain cases a presentation of the breech would be considered favourable, especially by those who are in favour of version rather than of the forceps.

During labour the position of the head is of great importance, for where engagement has already taken place the amount of flexion not only determines the prognosis but indicates the variety of the deformity, *e.g.*, in justo-minor pelves the amount of flexion is extreme, while in flat pelves flexion is less marked even than normal. In the case of flat pelves engagement is unusual except in the transverse diameter, while in uniformly contracted, engagement usually takes place in the oblique diameter. Engagement after the head freely ballotted above the brim would, of course, be favourable. Brühl[1] remarks that if the skull is about half sunk into the pelvis, then with good pains the birth will be spontaneous.

5. The most important result of the abdominal examination is that which enables one to compare respectively the dimen-

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[1] Brühl, *loc. cit.*, p. 79.

sions of the head and of the brim. A rough indication of the relationship of the one to the other can be obtained by observing how far the fœtal skull overlaps the symphysis. As the head rests on the brim its general size can be readily gauged; while its consistence, which is more important, and the compressibility of the cephalic extremity can also be ascertained.

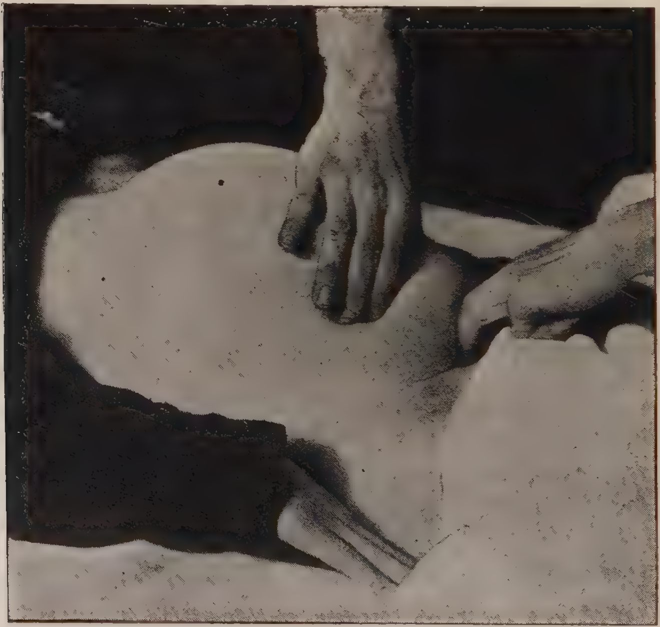

FIG. 12.

This attribute of the skull is employed in Müller's method of telling when the utmost limit of time is reached, beyond which induction of labour must not be postponed. This procedure consists in attempting to make the head enter the brim, while the finger in the vagina indicates if the effort is succeeding. Chloroform is usually required if the operation is to be successfully carried out; for a considerable amount of force is often necessary to overcome the resistance of the soft parts. For this reason it is difficult to understand how the weight of the child, when the woman is in the erect posture, can force the head to enter the brim, as Griffith has described.[1] The weight of the child immersed in liquor amnii must be fractional.

Pinard [2] has described a method by which one may ascertain the latest period for inducing labour. The fingers of one hand are depressed into the brim over the symphysis (as represented in figure 12), and by pressing on the head from the abdomen with the other hand the presenting part is forced to descend against the borders of the brim; its ability to pass through, or dip well into the brim, is perceived by the fingers, which are pressing into it anteriorly. A number of instances are given by this writer in support of his plan. There is no doubt that the manœuvre is a most useful one; as any one can easily verify for himself. The method is much simpler than Müller's; and can be applied with greater frequency and with better success.

Herman [3] advised measurement of the length of the uterus and the girth of the abdomen in the estimation of the size of the child, where the head cannot be pressed into the pelvis, when the relative proportions of the presenting part and the pelvic canal are considered. (With regard to the estimation of the length of the child from measurement of the length of the uterus, see p. 24.)

Ahlfeld [4] remarks that the direct measurement of the fœtal head by means of calipers is accurate, for the interposed tissues may be neglected as they are thinned out below the points of the instrument by the pressure required to get them firmly against the fœtal skull. Barbour[1] says the fœtal head is the best pelvimeter.

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[1] Griffith, *loc. cit.*, p. 79.

[2] Pinard, *loc. cit.*, p. 4.

[3] Herman, *loc. cit.*, p. 79.

[4] Ahlfeld, *Lehrbuch der Geburtshülfe*, zweite Auflage, 1898, S. 89, Leipzig.

If the various complications of deformed pelvis can be recognised before labour, or as they arise, much enlightenment is obtained as to the course of the confinement, and the necessity for active treatment or otherwise is indicated. It is unnecessary to particularise further the various applications of abdominal palpation; for as the difficulties arise they will be best met by one who is cognisant of them.

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[1] Barbour, "Abdominal Palpation in Pregnancy." *International Clinics*, 7th Series, vol. i., p. 295.

# CHAPTER XXI.

## EXPRESSION.

Historical—Kristeller's Method—Indications—Uses—Expression of Parts of the Fœtus, Trunk, After-coming Head—Advantages of over other Methods.

An interesting historical account of this method is given by Engelmann[1] as practised among the ancients and among non-civilised modern peoples. Ferkin[2] describes and figures various methods of expression employed by African natives.

As a scientific therapeutic measure external manipulations to hasten delivery are usually associated with the name of Kristeller.[3]

Expression may be employed to expel the entire fœtus or only a part of it. The application of expression to the delivery of the placenta requires to be treated of separately (see p. 173).

1. To hasten delivery generally:—

The various points drawn attention to by Kristeller in the advocacy of his method are:—

(1) It shortens labour.

(2) The normal position of the child is preserved.

(3) An application of the forceps is rendered unnecessary.

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[1] Engelmann, "Massage and Expression or External Manipulations in the Obstetric Practice of Primitive People," *American Journal of Obstetrics*, 1882, vol. xv., p. 601.

[2] Ferkin, "Notes on Labour in Central Africa," *Transactions of the Edinburgh Obstetrical Society*, 1884, vol. ix., p. 28.

[3] Kristeller, "Neues Entbindungsverfahren unter Anwendung von äusseren Handgriffen," *Berliner Klinische Wochenschrift*, 1867, No. 6, S. 56; "Neues Entbindungsverfahren unter Anwendung äusserer Handgriffe," *Monatsschrift für Geburtskunde*, Bd. xxix., S. 337.

(4) It thereby aids in protecting the perineum.

(5) It facilitates and hastens delivery with the often necessary forceps.

(6) Upward extension of the arms in breech presentation is prevented.

(7) After birth of the head the birth of the shoulders is hastened.

The method as recommended by Kristeller may be described as follows :—

The uterus is mapped out and any overlapping intestine is pushed aside. If a lateral obliquity or flexion exists it is corrected and the uterine axis put more in line with that of the pelvis. Occasionally, however, the application of pressure is more effective when the uterus is allowed to retain its asymmetrical position. Pressure is applied with both hands to the fundus and sides of the uterus during the pains for periods of from five to eight seconds with pauses lasting from one to three minutes. This is performed from ten to forty times as required. The pressure should be withdrawn gradually.

The various conditions which are requisite are :—

(1) A vertical presentation.

(2) No inflammatory affections or hyperalgesia of the abdominal walls.

(3) No sign of twin pregnancy.

(4) Os fully dilated.

(5) Low presenting part.

(6) Membranes ruptured.

(7) Pelvis normal, except in after-coming head cases.

The uses of the method according to Kristeller are :—

(1) In expelling the ovum in abortion.

(2) In molar pregnancy.

(3) Where there is an object in terminating labour, even where there are good pains present, *e.g.*, placenta prævia.

(4) For induction of premature labour.

(5) Where the pains are weak or deficient.

(6) As an aid to the forceps.

Bidder[1] recommends the manœuvre and cautions against the employment of too much force as apt to asphyxiate the child (especially if the placenta happens to lie between the child's body and the hands of the operator). He also directs that the breech be brought into proper relationship with the head. The manner of carrying out this somewhat trying procedure may be learned from a glance at the accompanying figure.

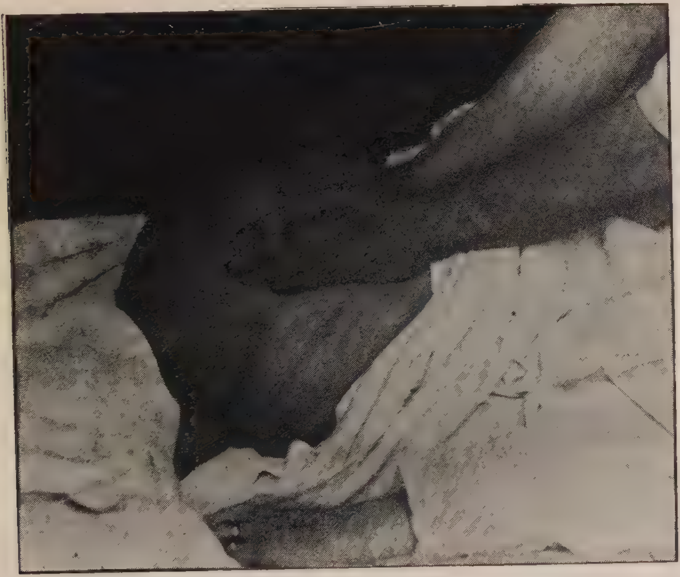

FIG. 13.

The amount of force must be limited. It is stated that in certain rural districts of Russia the midwives aid nature by sitting on the parturient's abdomen—a procedure more forcible than scientific, and one which illustrates the misuse of this method. Rupture of the uterus may readily be caused by rough external, as well as by internal, manipulation. In many apparently favourable circumstances a very considerable pressure applied to the fundus fails to induce the slightest descent of the presenting part, and merely causes a corresponding bulging of the uterus elsewhere.

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[1] Bidder, "Zur Beurtheilung der Kristeller'schen Expressions-Methode bei Kopflagen," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1878, Bd. iii., S. 241.

In certain cases suprapubic pressure applied to the head, after reposition of a prolapsed cord, will cause the head to occupy the entire available space and prevent the recurrence of the prolapse.

In many of the conditions enumerated by Kristeller as suitable for the application of his method, it is obviously inadvisable to practise it, and in a number more it will be found that it does not effect the desired result. Thus, force applied in a case of hydatidiform mole, to the uterus distended and thinned—often to the point of rupture—is bad, as is remarked upon by Mundé.[1] For the induction of premature labour, expression would require to be magnified into a dangerous injury before labour would be set up. In some cases of uterine inertia it is as inadvisable to expel the fœtus as it is to extract it at all, at that particular time.

The chief drawback to the employment of expression is that it soon wears out the operator, but when there is plenty of assistance it can be more thoroughly carried out. The force may also be applied as traction instead of pressure as has been indicated in the diagram No. 13 (p. 155), and this is the way figured by Mundé; though the flanks are well supported by this method, which is represented in figure 14, the procedure is more exhausting, and in other ways not so convenient.

According to Kristeller, general anæsthesia is not always essential, though in occipito-posterior cases, where the anterior uterine wall is tender, it will be beneficial.

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[1] Mundé, *loc. cit.*, p. 4.

2. Expression as applied to a part of the fœtus.

After birth of the head, the method of expression is usually resorted to, to hasten delivery of the trunk. The force is here applied usually as indicated in figure 13 (p. 155), though the other manner of acting is also applicable.

Expression of the after-coming head, as distinct from other methods of delivery of the head in breech cases, is known as the Wigand-Martin method. Eisenhart,[1] in comparing this method with the Mauriceau-Lachapelle (sometimes called the Veit-Smellie), affirms that after the employment of the former—

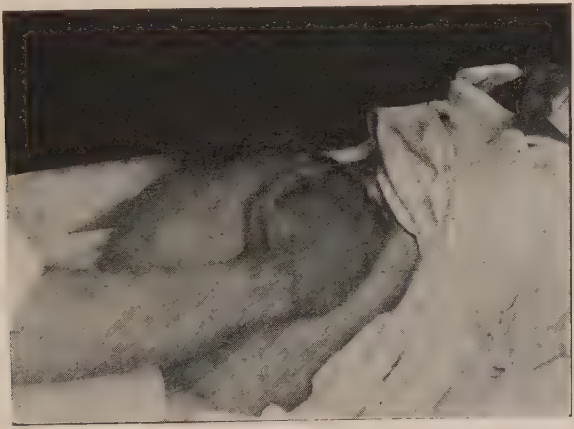

FIG. 14.

(1) There is a better puerperium;

(2) The expectation of a living child is seven times greater; and

(3) There is less chance of injuries to the child.

This procedure is commonly employed to aid the engagement and descent of the after-coming head, and especially is it useful where the brim is contracted. It is much preferable to attempting to deliver the after-coming head by the forceps.

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[1] Eisenhart, "Mauriceau-Lachapelle'scher oder Wigand-Martin'scher Handgriff," *Archiv für Gynäkologie*, Bd. xxxvi., S. 301.

The manner of doing this is somewhat after the method shown in figure 13 (p. 155); pressure being made from above with both hands (the flexor surfaces of the wrists being together), which are spread out over the suprapubic region, so as to envelop as much of the head as possible.

# CHAPTER XXII.

## VERSION.

A. HISTORICAL.

B. CLASSIFICATION.

I. CEPHALIC VERSION.

1. Methods:—
   - (1) In Oblique Presentations: (*a*) During Labour; (*b*) Prophylactic.
   - (2) In Breech and Transverse: (*a*) During Labour; (*b*) Prophylactic, Belt in (Theory of, also in High Situation of the Head, Where Accommodation is Restricted), Postural Treatment, Often Little Benefit.
2. Conditions:—
   - (1) Cause of the Abnormality.
   - (2) Attitude, Presentation and Position of the Child *in Utero*.
   - (3) Bladder Empty.
   - (4) Proper Time for, in Prophylactic.
   - (5) General Anæsthesia, not Necessary in all Cases.
3. Indications for Cephalic Version:—
   - (1) Oblique Presentation: (*a*) Uncomplicated; (*b*) Complicated with Labour and Rupture of the Membranes; (*c*) with Placenta Prævia; (*d*) with Contracted Pelvis; (*e*) Accompanied by Prolapse of the Cord.
   - (2) Breech Presentations or Transverse: (*a*) During Labour, Fundus with Head High and Engagement Late; (*b*) Prophylactic Treatment.
4. Contra-indications:—
   - (1) Dead Fœtus.
   - (2) Multiple Pregnancy.
   - (3) Winding of the Cord round the Neck or Other Part of the Fœtus.
   - (4) Fixed Breech in Primiparæ.
   - (5) Malformations of the Uterus.
   - (6) Ascent of Bandl's Ring, with Thinning of the Lower Uterine Segment.
   - (7) Advanced Labour, with Moulding of the Fœtus within the Uterus.
   - (8) Pelvic Tumours, etc.

II. PODALIC VERSION.

III. TRANSFORMATION OF AN OCCIPITO-POSTERIOR INTO AN OCCIPITO-ANTERIOR POSITION.

IV. REDUCTION OF A BROW OR FACIAL PRESENTATION INTO A VERTEX.

## EXTERNAL VERSION.

**A. Historical.** — The history of version, as of palpation generally, is fully given in Pinard's work, so there will be nothing gained by repeating it; any one interested in the subject is referred to that work. Sprengler[1] gives an account of the procedure, and has a history of the subject at the beginning of his paper. Ellinger[2] while reporting three cases gives a short historical sketch, so that from these writers this aspect of the subject can be well read up.

In this country external version has been advocated only by those students who had imbibed the views of their continental teachers, and as in the case of palpation isolated writers have advocated the application of the external as distinct from the internal manipulative treatment. Edis[3] had drawn attention to the merits of the method as early as 1872, but the plan advocated by Braxton Hicks[4] was getting too firm a foothold to be supplanted or supplemented by the newer method.

British workers and writers have hitherto added little to the elucidation and advancement of the principle. Mundé[5] in America has written, in 1880, advocating the employment of version conducted by external manipulation, while recently Herbert Spencer[6] in this country commends the employment by obstetricians of external prophylactic version.

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[1] Sprengler, "Wendung auf den Kopf durch äussere Handgriffe," *Monatsschrift für Geburtskunde*, 1854, Bd. iii., S. 184.

[2] Ellinger, "On Extra-abdominal Version," *American Journal of Obstetrics*, 1877, vol. x., p. 218; "Zur extra-abdominalen Wendung," *Wiener Medizinische Wochenschrift*, 1877, No. 9, S. 198.

[3] Edis, *loc. cit.*, p. 3.

[4] Hicks, "On a New Method of Version in Abnormal Labour," *Lancet*, 1860, vol. ii., pp. 28 and 55; "Combined External and Internal Version," *Transactions of the London Obstetrical Society* (1863), 1864, vol. v., p. 219.

[5] Mundé, *loc. cit.*, p. 4.

[6] Spencer, *loc. cit.*, p. 135.

To Professor Pinard, however, is due most of the honour for placing the method on a firm scientific basis.

**B. Classification.**—External version may be classified as follows :—

I. Cephalic version.

II. Podalic version.

III. Transformation of an occipito-posterior into an occipito-anterior position.

IV. The reduction of a facial or brow presentation into a vertex (Schatz' method).

## I. CEPHALIC VERSION.

1. *Method.*—Cephalic version in its turn may be subdivided into (1) version in oblique cases, and (2) version in breech or transverse cases.

(1) It has been often disputed whether in oblique presentations the head should be brought into relationship with the brim instead of turning the presentation into a breech. There is usually nothing easier than to transfer the head from the iliac fossa into the brim, even after labour has been in progress for some considerable time, and it seems a foolish thing, when interference is necessary at all, merely to change the presentation into one only *less* dangerous for the mother, and not to put the child in the very best position possible. Most authorities agree that cephalic version is the desirable one to be attempted. Even in contracted pelvis it is a very questionable benefit to perform podalic version. Abbot[1] reports a case where even with contracted pelvis and rupture of the membranes cephalic version was performed, because the history of former labours

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[1] Abbot, "Cephalic Version by External Manipulation in a Case of Foot Presentation," *Boston Medical and Surgical Journal*, 1871, N.S., vol. vii., p. 351.

showed that there was a better chance for the offspring with head presentation than with any other. There can be no doubt that if prophylactic version for breech cases is at all feasible, then there can be no question as to the advisability of cephalic version in oblique presentations. When performed prophylactically for oblique cases the same after-treatment as follows version in breech presentations is necessary.

The method described by Pinard for cephalic version in oblique presentations may be thus briefly described :—

One hand is applied to the head and the other to the breech. A gradual (*lente*) and sustained pressure is applied in opposite directions to the two poles so as to bring them into the middle line. In remarking on the statement of Nivert,[1] who advises the manipulations to be confined to the head, Pinard says that pressure applied to one pole is as useful as that applied to the other, and therefore recommends both poles of the fœtus to be acted upon so as to get the double advantage, and also that in certain cases merely to attempt to move the head would be unsuccessful.

(2) Cephalic version in breech and also in tranverse presentations.

This procedure may be performed during labour, or, on the other hand, it may be undertaken during pregnancy, and is then prophylactic version.

This manœuvre, either when done (*a*) during labour, or (*b*) as prophylactic version, has given rise to discussion.

(*a*) Here the first part of the operation consists in freeing the fœtus. In multiparæ, as the abdominal parietes are lax, movement of the fœtus is easy. In primiparæ, especially as term is approached, the mobility of the fœtus is less. The head may be deeply placed under the ribs, for in breech presentations the fundus is high on account of the whole fœtus being above the brim. The head then must be displaced before version is attempted. To accomplish this, Pinard recommends that it be moved laterally towards one side, but in cases where this is not possible, or is impracticable, the breech must be acted upon and the movement communicated to the head from the breech through the body of the child. On the other hand, the breech may be more or less in a fixed position, even though it be not engaged; in order to displace the breech in these circumstances both hands are required to act upon it. It may even be necessary before it can be freed to have recourse to manipulation from the vagina. This does not bring the case into the category of one that requires the combined method; the vaginal manipulation is employed merely to free the breech, and this is done by displacing it upwards, while at the same time directing it a little toward the side opposite to the head. Having achieved this, the hand is withdrawn from the vagina and again applied to the head. In cases (usually primiparæ) where there is difficulty in freeing the breech a general anæsthetic should be administered. There are some cases where even with the aid of an anæsthetic version cannot be performed (Pinard). The breech should be moved in the opposite direction to the head, and the head should be directed towards the lower part of the flank in which it already lies; as put by Pinard, the fœtus should be turned into the correct presentation through the shortest path. In Pinard's diagrams the head is pushed down face first, which is the most natural way; while in Spencer's the head is directed to be pushed occiput first. This latter method will produce an extension of the body of the child, which is to be avoided. The belt (see p. 164) which Pinard employs after version need not be applied in every case during labour, but only in such as show a tendency to revert to a malpresentation, or where engagement of the new presenting part is tardy.

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[1] Nivert, *De la version céphalique par les manœuvres externes dans les présentations vicieuses du fœtus*, Paris, 1862.

(*b*) The performance of prophylactic version is the natural outcome of the discovery that external version can be so easily performed.

It is necessary that the pregnant woman should be examined previous to term if this operation is to be successfully carried out. At one time the examination of the gravid abdomen was thought to be quite unnecessary.[1] Pinard argues that as the mortality, both maternal and fœtal, is so high it is absurd to reckon breech presentations as natural, and if they are not natural then they should be treated at a time when treatment is available. It is true, as he mentions, that many cases are corrected spontaneously, but to await the efforts of nature may be throwing away the only chance for successful preventive treatment. The gratifying results of this method form an unanswerable argument in its favour.

By the application of a specially designed abdominal belt Pinard has further enhanced the value and increased the utility of external version. Spencer[2] in his article on this subject remarks that Pinard's belt is somewhat cumbersome, and he finds that an ordinary abdominal belt is sufficient (even though home made). Pinard argues that as in succeeding gestations the chances of malpresentation are increased, and as this cannot be due to any peculiarity in the fœtus developed in the pluriparous uterus, it must be owing to some inherent change in the uterus and in the abdominal walls (the solid pelvis being naturally excluded from participating in the changes consequent to parturition). The change which does take place is in the diminution of the elasticity or tonicity of the uterine and abdominal walls; so that there is not the same intra-uterine tension, and the fœtus is not as it were constrained to take up any special attitude, presentation or position. Thus by the imposition of the belt as recommended by Pinard, the tension of the abdomen may be supplemented, and moreover the pressure exerted by different parts of the belt may be regulated. On either side of the belt is a pneumatic cushion so fitting that the one side of the abdomen may have more pressure applied to it than the other, and that, should there be a tendency for the uterus to be pressed out asymmetrically (accommodating itself to the malpresentation), then by extra pressure at this area the underlying part of the fœtus may be compelled to retain its proper position. Pinard, therefore, applies his binder in all cases after prophylactic version (to prevent a return of the abnormality, which sometimes readily occurs) till the engagement of the presenting part takes place. A postural treatment, as recommended by Mundé,[1] is of little use, for even the act of rising from the couch is sufficient to induce the return of the faulty presentation. There is also some difference of opinion regarding the action of posture on the position of the child; this is alluded to by Edgar[2] in a paper on the various methods of treatment applied to the reduction of facial or brow presentations into vertex ones.

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[1] Playfair, Discussion on Paper by Edis, *Lancet*, 1872; *loc. cit.*, p. 3.

[2] Spencer, *loc. cit.*, p. 135.

The tension of the binder should be so graduated that a considerable amount of pressure is eventually applied to the abdomen. If erythema results, the application of a pad of boracic gauze is recommended. The results achieved by Pinard and others by this method entirely justify its adoption and the trouble required to carry it out. Pinard also finds the belt a useful aid to nature in those cases at the eighth month where the head should have entered the brim in whole or in part, but has not. Its action renders the later interference less serious than would be the case were all treatment delayed till the last moment. In such cases it also prevents prolapse of the cord and the presentation of the brow or the face, which is apt to supervene where the pelvic accommodation is restricted.

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[1] Mundé, *loc. cit.*, p. 4.

[2] Edgar, "The Treatment of Brow Presentation, with Notes of Two Cases," *Glasgow Medical Journal*, March, 1900.

2. *Conditions.*—It is essential before version is attempted at all (1) that a clear understanding of the cause of the abnormality be arrived at; (2) that the attitude, presentation and position (see p. 109) of the fœtus be recognised; (3) that the bladder be empty; and (4) that the proper time for the version be chosen. According to Pinard the eighth month is recommended as the best time for performing version, as at that time the fœtus is freely movable, while later on the presentation tends to become permanent. Spencer[1] regards the seventh and a half month as the best time to interfere. (5) If the attempt fails without general anæsthesia then chloroform should be administered.

3. *Indications for Cephalic Version.*—The conditions which indicate the desirability of performing external version are the following:—

(1) Oblique presentations, whether simple or complicated by prolapse or presentation of the cord, placenta prævia, etc.:—

(*a*) Uncomplicated cases: in all such cases cephalic version ought to be the operation of election.

(*b*) Complicated with rupture of the membranes or onset of labour: numerous cases are on record where version has been successfully performed after rupture of the membranes.[2] In many of these cases the combined method or even the internal method must be resorted to before the child can be turned, if, indeed, version be possible at all.

(*c*) Complicated by placenta prævia: this is usually considered as a contra-indication for cephalic version, but Pinard thinks that this should not be so. It is very questionable whether the placenta can be detached except by manipulation unnecessarily rough, and there can be no doubt that the head will control the hæmorrhage more effectively than would the breech. Labat[1] considers cephalic version renders hæmorrhage less grave; while Spencer places placenta prævia among the contra-indications.

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[1] Spencer, *loc. cit.*, p. 135.

[2] Sprengler, *loc. cit.*, p. 160; Mundé, *loc. cit.*, p. 4; Coleman, "Cephalic Version by the External Bi-polar Method," etc., *American Journal of Obstetrics*, 1877, vol. x., p. 631, and many others.

(*d*) Contracted pelvis: this is not always a contra-indication for cephalic version; it will depend on the preference of the operator, for version or for the use of the forceps. In the opinion of the author, version in contracted pelvis is of very limited application; so that cephalic version is indicated in those cases where there is the possibility of getting the head past the obstruction at all. (*e*) If the cord be prolapsed and can be reposited the best treatment is to fill up the lower uterine segment and the brim with the head after the reposition of the cord.

(2) In breech or transverse presentations the operation of election is also cephalic version. In many cases, even after the eighth month, the version is spontaneous, still it is safer to forestall nature and convert the dangerous breech or transverse presentation into a vertex, and to retain it as one by means of the abdominal belt. Version is quite feasible after even an advanced stage of labour in breech cases, for in them engagement is slow and high.

4. *Contra-indications for the Operation of Cephalic Version.*—

(1) Where the fœtus is known to be dead, version is useless as a procedure in aid of the child.

(2) Multiple pregnancy: version is, in such cases, not impossible, but is injudicious. After the birth of one child the second (in twins) may be turned by external manipulation, if it present by the breech. (Unfortunately the reverse order of procedure is commoner; the presentation by the head of the

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[1] Labat, Revue clinique, "Note sür la version par manœuvres externes pendant le travail," *Annales de Gynécologie*, 1881, t. xv., p. 37.

second twin being turned into a breech by the internal method —a somewhat unjustifiable interference.)

(3) Short or relatively short cord: Lefour[1] emphasises the possibility of the cord being interfered with during external version, and he thinks the winding of the cord round the neck of the child a contra-indication. He reports a case where version was performed with difficulty in a breech presentation, and where it returned a second time. The child was born dead by the breech with the cord wound round its neck. He refers to shortness or relative shortness of the cord as a cause of breech presentation, and mentions the production of a funic souffle as a guide to the recognition of the condition (see also p. 94). Budin[2] reports also a similar case. Winding of the cord round various parts of the fœtus takes place repeatedly in almost every case; but these natural turnings seem, as a rule, to do little harm, and it is hardly to be expected that a single extra half turn, artificially produced, will prove of serious moment, unless the cord is already relatively or really short, as in the cases referred to above.

(4) In primiparæ, mainly, where the presentation is a fixed (*franche*, Pinard) breech, and where turning perhaps is impossible, and when after a general anæsthetic has been administered, the breech cannot be freed, then further attempts should be desisted from.

(5) In certain rare malformations of the uterus, as, for instance, the presence of a median septum as reported by Polaillon,[3] though Pinard has succeeded in a similar case in turning a shoulder presentation into a vertex.

(6) Where Bandl's ring is well marked, and especially where

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[1] Lefour, "Version céphalique par manœuvres externes dans les présentations pelviennes et circulaires du cordon autour du col fœtal," *Archives de Tocologie*, 1888, t. xv., p. 524.

[2] Budin et Tarnier, *Traité des Accouchements*, 1901, t. iv., p. 73.

[3] From Pinard.

it is rising, and accompanied by thinning of the lower uterine segment.

(7) Where labour has advanced, the fœtus being more or less moulded within the uterus, and where, perhaps, an arm has prolapsed.

(8) Where there are pelvic obstructions, tumours, etc., which will require special treatment, version is, of course, contra-indicated.

## II. PODALIC VERSION.

Podalic version is performed in the same way as cephalic, but the breech is brought down instead of the head. The indications for this manœuvre are very much the same as those which call for the employment of the method of Braxton-Hicks. Some obstetricians prefer to turn an oblique or transverse presentation into one of the breech.[1]

Podalic version is indicated in all cases of transverse presentation where cephalic has failed. In certain cases of irregularly contracted pelves, it is occasionally easier to bring down the head with its longest diameter corresponding to that of the pelves if the head follows the body. The question of podalic version in placenta prævia has been referred to on a previous page (see p. 167).

## III. TRANSFORMATION OF AN OCCIPITO-POSTERIOR.

In occipito-posterior positions of the head, by turning the head presentation provisionally into a breech, and then back again into a vertex, it may be so arranged that the occiput gets placed in front. This operation has been performed by Loviot.[1] That the operation is capable of performance is certain, but for any one to prefer the risk of interference with the cord by substituting external version for the more efficient manipulation from the vagina, seems to the author like claiming for the external method an effectiveness which it by no means possesses.

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[1] Carson, "Turning by External Manipulation," *Medical Times and Gazette*, 1864, vol. ii., p. 469.

## IV. REDUCTION OF FACIAL OR BROW PRESENTATIONS.

The name of Schatz[2] is associated with this application of the principle of external version.

In order to perform the manœuvre properly, a complete understanding of the attitude and position of the child is necessary. Before the plan is resorted to, the cause of the abnormality, as is indeed necessary for any method of treatment, should be ascertained. Having rapidly mapped out the lie of the child, pressure is applied to the breech and the thorax in such a way that extension of the trunk is converted into flexion. The shoulder and thorax of the child are pressed upwards and laterally, while the breech is pressed downwards and laterally in the opposite direction to that of the thorax. The method is best illustrated diagrammatically (see figs. 15, 16 and 17).

The attempt to perform the change is made between the pains. Schatz remarks that the method can be applied any time during the first stage, and in certain cases even later, though the earlier the attempt the better the success. He also says that if engagement has taken place the attempt should not be made. In converting occipito-posterior cases into vertex presentations, as it is quite safe to lift out the head from the brim and even from the pelvic canal, so the same manœuvre could well be undertaken in such facial cases before proceeding with the reduction by Schatz' method.

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[1] Loviot, "Des mutations de position par manœuvres externes pendant la grossesse," *Bulletins et Mémoires de la Société Obstetricale et Gynécologique de Paris*, 1889 (for 1888), p. 155.

[2] Schatz, *loc. cit.*, p. 120.

After having succeeded in reducing the presentation, the membranes should be ruptured and the head pressed into the brim. Schatz remarks that no anxiety need be felt that a partial reduction may result in an impossible brow presentation, for the original abnormality will recur. A postural treatment of the woman should also be utilised, and she should be made to lie on the side to which the breast of the fœtus looks, so that the breech may fall over with the fundus and tend to keep up the state of flexion. Edgar,[2] while referring to the postural treatment of the condition, expresses disbelief in its utility, and his opinion gains weight on account of the recommendations of the various authorities being found as contradictory as their theories.

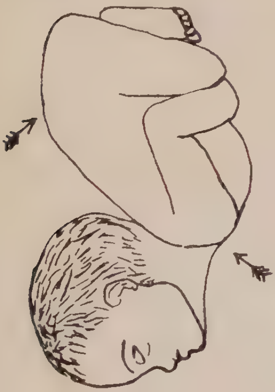

Fig. 15.[1]

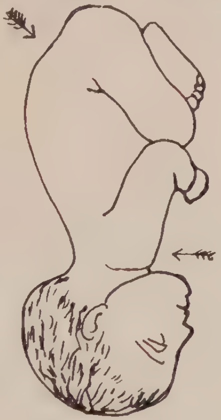

Fig. 16.[1]

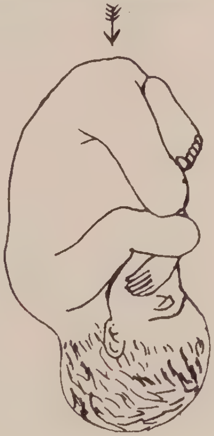

Fig. 17.[1]

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[1] From Lusk, *loc. cit.*, p. 20.

[2] Edgar, *loc. cit.*, p. 165.

The difficulties which are encountered in the manœuvre are sometimes insurmountable. Pinard recommends a combined method, and this may be resorted to in a case of failure by the purely external method. One difficulty is to get the force applied to the posterior shoulder and posterior part of the trunk. In some chloroform will be essential for the success of the operation. Pinard does not think that the method of Schatz is of very wide application, for the abdominal and uterine walls offer too great a resistance; while Edgar remarks that the diagnosis of the presentation is usually made too late for the method to be available.

# CHAPTER XXIII.

## MANAGEMENT OF THE THIRD STAGE OF LABOUR.

Introduction—Historical—Dublin Method—Modifications—Credé's—Ahlfeld's—Changes in the Height of the Uterus—Difficulties in Expelling the Placenta—Recommendations.

## MANAGEMENT OF THE THIRD STAGE.

After expulsion of the child the abdominal method of managing the third stage is admittedly the easiest, safest and best.

One hand, if free, should follow the contracting uterus as the trunk and limbs of the child are born. After this event the patient should be turned on to her back. This should be done for the following reasons:—

1. It is more convenient to control the uterus in the dorsal position.

2. The anterior and posterior parts of the pelvic floor come into contact, and air is thus prevented from entering the uterus.[1]

3. In the dorsal position the uterus tends to sink into the pelvis, whereas in the lateral posture it tends to fall out of the pelvis and to suck air into the vagina, etc.

By a gentle digital excitation the uterus is made to contract as a whole. This contraction causes the separation of the placenta. Such massage of the fundus must not be too active, nor is it essential to keep the uterus constantly in a state of spasm.

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[1] Hart, "Some of the Phenomena of Parturition in Their Practical Aspects," *Transactions of the Edinburgh Obstetrical Society*, vol. vi., p. 128.

According to Fehling[1] the placenta is usually detached by the same pain which expels the child. Gessner[2] says that the first after-pain produces the separation of the placenta. Champneys[3] in his article on the third stage refers to the investigation of Lesmer, who found on internal examination in 168 cases that the placenta was entirely detached immediately after birth of the child, while Barbour[4] remarks that the placental site may have contracted to 4 inches by 4 inches without separation having taken place. There can be no doubt that a large part of the placenta is separated as the uterus contracts to expel the breech and limbs of the child, but it is not probable that the entire after-birth is separated.

Further painful contraction of the uterus starts the expulsion of the placenta from the cavity.

To christen the external method of expelling the placenta after the name of any person or town certainly leads to confusion. In text-books generally the name of Credé is associated with this method; but all descriptions of it given by other authors do not, and probably are not meant to, tally with his. Barbour[5] draws attention to the general misconception of what is meant by Credé's method. The Dublin school, however, claims to have originated and perfected the external management of the third stage.

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[1] Fehling, "Ueber den Mechanismus der Placentarlosung," *Archiv für Gynäkologie*, Bd. xxxii., S. 452.

[2] Gessner, "Beiträge zur Physiologie der Nachgeburtsperiode," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1897, Bd. xxxvii., S. 17.

[3] Champneys, "The Mechanism of the Third Stage of Labour," *Transactions of the London Obstetrical Society*, 1887, vol. xxix., p. 117.

[4] Barbour, "Uteri at the Onset of Labour and after Delivery," *Transactions of the London Obstetrical Society*, vol. xxviii., p. 73.

[5] Barbour, "The Anatomy and Relations of the Uterus during the Third Stage of Labour and the First Days of the Puerperium," *Transactions of the Edinburgh Obstetrical Society*, 1884, vol. ix., pp. 88, 89.

First in 1853[1] and again in 1860[2] Credé described his method.

"The whole hand," he says, "is laid softly on the uterine region. At first soft stroking movements over a large surface of the uterus are made till the onset of a contraction takes place, then boldly with outstretched fingers and hand, or, if one hand be not enough, with both hands, the uterus is grasped, and, when the contraction has reached its acme, pressure on the fundus and wall of the uterus is made in the direction of the hollow of the sacrum. . . . Without a contraction being present it is a mistake to apply pressure and it does not succeed." In 1861[3] Credé again described his method, mainly from the standpoint of his claim to be the first to employ it. In this paper he gives an historical sketch of the methods previously employed to terminate the third stage. Many writers are cited by him, some of whom seem to have been more or less aware of the value of the external method.

Jellet,[4] in his paper claiming priority for his school, begins the genealogy with the name of Ould in 1742. The extracts given from this writer merely show that he was striving after a more rational way of conducting delivery than was in vogue in his time, and that he was dissatisfied with the two methods usually adopted, either of manually removing the placenta immediately after birth of the child, or, on the other hand, of delaying till it was expelled naturally, after hours, days, weeks, or even months. Jellet also refers to Foster (1783) and Deas (1783). To this latter more credit is due than to the others, for he evidently had some idea of expelling the placenta from the vagina after it had left the uterus by pressure on the fundus. He also recognised the signs which indicated that the placenta had left the uterine cavity. White in 1791 [1] strongly recommends abdominal pressure for extrusion of the placenta from the vagina.

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[1] Credé, *Klinische Vorträge über Geburtshülfe*, 1853, S. 599-600.

[2] Credé, "Vortrag über die von ihm geübte Methode der Entfernung des Fruchtkuchens bei natürlicher Geburt," *Versammlung deutscher Naturforscher und Aerzte in Königsberg*, 1860; *Monatsschrift für Geburtskunde*, Bd. xvi., S. 337.

[3] Credé, "Ueber die zweckmässigste Methode der Entfernung der Nachgeburt," *Monatsschrift für Geburtskunde*, Bd. xvii., S. 274.

[4] Jellet, "The Dublin Method of Effecting the Delivery of the Placenta." *Dublin Medical Journal*, 1900, vol. cix., p. 412; *British Medical Journal*, 1900, vol. ii., p. 96.

There can be no doubt that an external method was practised in Dublin and elsewhere before Credé's time. Credé claims to be the first to have taught that the external method was applicable to all cases, and that the proper time to aid nature was during the pain. He claims later on (1888) [2] to have developed and perfected what he prefers to call, not Credé's, but the external method. He points out that he never named a time within which the placenta should be expressed ; but he helped the pains, and by so doing usually succeeded with the third or fourth pain in expelling the after-birth. At the same time he utters a warning against employing too great force. In his writings there is no hint given as to whether during the operation the placenta be in the uterus or not. As practised by himself, Credé's procedure would most likely be the extrusion of the placenta from the vagina (though it is not so figured) by pressure on the uterus from above. In his publications the only data given for the guidance of others as to the amount of pressure which is legitimate is the employment of the word gentle (*sanft*), which appears in his first description in 1853, and which was printed in large type in an article in 1884.[3] It is in this that his method differs from, and is inferior to, the so-called Dublin method.

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[1] White, *A Treatise on the Management of Pregnant and Lying-in Women*, Edinburgh, 1791.

[2] Credé, "Die Behandlung der Nachgeburt bei regelmässigen Geburten," *Archiv für Gynäkologie*, Bd. xxxii., S. 96.

[3] Credé, "Abwehr gegen Ahlfeld's 'Berichte und Arbeiten aus der Geburtshülflich-Gynäkologischen Klinik zu Giessen, 1881-82,'" *Archiv für Gynäkologie*, Bd. xxiii., S. 302.

Jellet,[1] while claiming honour for his school, says that there is no difference between Credé's method and the Dublin.

Smyly[2] draws attention, as does Spiegelberg,[3] to *the* point in the Dublin method, *viz.*, *separation* of the placenta. Spiegelberg writes: "Credé's method practically amounts to expression of the after-birth. I, on the contrary, lay most stress (following in this respect the plan of the Dublin Rotunda) on early and regular, *i.e.*, generally distributed, contraction of the uterus, since this is the cause of the detachment, and such detachment, not the expression, is the important matter." In Credé's procedure the expulsion of the placenta from the uterus is very much hastened, and that in proportion to the amount of pressure applied. Prefixing "Dublin" before method merely designates the method as practised by teachers in Dublin, and accordingly it has undergone various minor modifications. In principle, however, it differs considerably from that described by Credé. Smyly[4] has advocated a mixed method—what has formerly been called the "Dublin" and Credé's method. In the discussion following Jellet's paper he also pointed out that the teaching of Credé was very different from the Dublin. With this Mundé[5] concurs. Credé[6] himself recognised the difference and remarked that on account of the Dublin method requiring more than one pair of hands and skilled assistance he had not taught it, as it was unsuitable for practice elsewhere than in a

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[1] Jellet, *loc. cit.*, p. 175.

[2] Smyly, In discussion following Jellet's paper, *British Medical Journal*, 1900, vol. ii., p. 96.

[3] Spiegelberg, *loc. cit.*, p. 23.

[4] Smyly, "The Management of the Third Stage of Labour," *British Medical Journal*, 1885, vol. i., p. 9.

[5] Mundé, *loc. cit.*, p. 4.

[6] Credé, "Ueber die zweckmässigste Methode der Entfernung der Nachgeburt," *Archiv für Gynäkologie*, 1881, Bd. xvii., S. 271.

hospital (in mentioning the Dublin method he gives the work of Spiegelberg as reference). In the article cited Smyly recommends that the hand should follow down the descending fundus, which must not on any account be allowed to relax. Later Dr. Smyly taught that it was not necessary to follow down the fundus, as the hands of the accoucheur were best occupied elsewhere. He also advised that the separation of the placenta should be more spontaneous than induced. Thus the Dublin method, or the method taught by an authority in Dublin, has diverged more and more from Credé's and has become less active. The claim of the Dublin school to priority, whether it be valid or not, has done much to place the management of the third stage on a sound and rational basis. Byers[1] said in a paper on this subject: "They must try to allow the placenta to be separated by the uterus itself; it was when this had occurred and when the upper, thick, active, contracting portion of the uterus had driven the placenta into the lower uterine segment (which was expansile and passive) or vagina that pressure from above the axis of the brim should be made to expel the after-birth". In a later paper[2] he instructs that the hand should follow the fundus when the head is born, and that no attempt should be made to massage or stimulate the uterus; all that is required being simply to control the uterus with the hand and to ascertain when the placenta has separated. The author thinks the "control" of the uterus often necessitates massage, so that it is as well to explain what is meant by control of the uterus. According to the writer "control" ought to include prevention of distention of the uterus with blood clot; the minimum amount of massage and irritation compatible with this should be resorted to. In strictly normal cases this requires no effort, and the hand is kept on the fundus to provide for the occurrence of abnormalities. The Dublin method, as taught latterly by Dr. Smyly in the Rotunda Hospital, may be summed up as follows :—

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[1] Byers, "The Management of the Third Stage of Labour," *Lancet*, 1898, 16th April.

[2] Byers, "The Prevention and Treatment of Post-partum Hæmorrhage," *Lancet*, 1900, vol. ii., p. 793.

Immediately after the birth of a child the woman is turned on her back, while the fundus is controlled continuously by the hand (in the manner explained) ; at the onset of a pain, some downward pressure, to hasten separation merely, is made on the hardened uterus. So far the method is a mild Credé's. When the placenta is separated, and has been expelled from the uterus by these assisted pains, the extrusion of the placenta from the vagina is to be proceeded with ; the amount of force (within bounds) being graduated by the result sought for, *viz.*, the *slow* delivery of the after-birth from the vulva. The placenta is recognised as having left the uterus when the following signs are observed :—

1. Lengthening of the cord, as noted by the descent of the tie or ligature, previously applied to the cord near the introitus.
2. Rising of the fundus.
3. Flattening and increased mobility of the body of the uterus.
4. Bulging of the abdominal wall over the symphysis, *i.e.*, distention of the lower uterine segment.

When these signs have occurred, firm pressure is made on the hardened fundus, so as to expel the placenta from the cervix, through the vagina, outside the genitals, and, as Smyly remarks, this should be done with the minimum of force. When the placenta is shot out of the vulva, the membranes are apt to be retained. Credé insisted that the uterus be firm, while the Dublin school teach that the uterus must be empty before expression is attempted.

There are thus various modifications in the external method of conducting the third stage :—

1. Credé's, as already described, taking no cognisance of the

situation of the placenta, be it in the uterus or the vagina, and employing enough force to expel it directly from the uterus to the bed.

2. The Dublin method (as understood by the writer), employing Credé's method to hasten the separation of the placenta; expression of the placenta being performed when it is in the vagina, and not before.

3. Expulsion from the vagina or uterus, as the case may be, after a fixed time. This is often miscalled Credé's method. It seems to the writer to be as dangerous to force out the placenta, after half an hour as after a quarter, if it be still in the uterus.

In the official handbook for midwives in Saxony, Leopold and Zweifel[1] ordain that expression may be resorted to after an hour, unless severe hæmorrhage be present, in which case expression may be resorted to sooner. Lichtenstein[2] is not in favour of expelling the placenta *immediately* after the birth of the child (called by him Credé's method); but advises delay for a quarter of an hour, during which uterine contractions are to be excited. Buckhardt[3] also reports profuse hæmorrhage with retention of placental tufts after the employment of Credé's method, understood by this author to be *immediate* delivery of the placenta after the conclusion of the second stage. Fischer[4] believes Credé's method not to be forcible expression of the placenta. It thus seems that Credé is given the credit for all manner of methods which are essentially different.

4. Ahlfeld's,[5] which consists in leaving the third stage to

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[1] Leopold and Zweifel, *loc. cit.*, p. 54.

[2] Lichtenstein, "Gegen den Credé'schen Handgriff," *Zeitschrift für praktische Aerzte*, 1897, No. 4.

[3] Buckhardt, "Zur Technik der Placentarlösung," *Centralblatt für Gynäkologie*, 1897, No. 45, S. 1344.

[4] Fischer, "Management of the Third Stage of Labour," *Russkaya Meditsina*, 10th August, 1886; Extract in the *Lancet*, 1886, vol. ii., p. 543.

[5] Ahlfeld, *loc. cit.*, p. 151; *Abwartende Methode oder Credé'scher Handgriff*, Leipzig, 1888.

nature, and not removing the placenta till one or one and a half hours have elapsed. Beaucamp[1] has instanced 500 cases in support of this method, and Pelzer[2] contrasts with these 1,000 cases, conducted by Credé's method. He asserts that as regards hæmorrhage, the puerperal state, etc., Credé's plan is the better.

Surely no one would wait a quarter of an hour, or an hour and a half, if at the end of five minutes the after-birth were in the vagina; nor should any one think of expelling the placenta at the expiry of any given time were the placenta still in the uterus, and no excess of bleeding caused thereby.

It seems to the writer that the best way of conducting the third stage is the Dublin one, as enunciated by Dr. Smyly.

Dohrn[3] advises that the placenta be expelled when it is mostly situated in the external os and vagina. To forcibly express the placenta, even during a pain, is not unlikely to be harmful, and to result in dangerous conditions; again, if the placenta be allowed to block the vagina indefinitely, the normal flow of blood will distend the uterus, and induce an abnormal hæmorrhage.

Freund[4] recommends that the placenta be expelled only after the sign of its separation and descent have been observed; he remarks that Credé's method does not allow sufficient time for the separation of the decidua, and that there is apt to be retention of the membranes. In all cases where it is desirable to hasten delivery, then Credé's method holds the field. These statements are controverted by Credé in the next volume of the *Archiv für Gynäkologie.*[1]

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[1] Beaucamp, "Ueber das abwartende Verfahren in der Nachgeburtsperiode," *Archiv für Gynäkologie*, Bd. xlii., S. 113.

[2] Pelzer, "Ueber das Credé'sche Verfahren in der Nachgeburtsperiode," *Archiv für Gynäkologie*, Bd. xlvii., S. 447.

[3] Dohrn, "Zur Behandlung der Nachgeburtszeit," *Deutsche Medicinische Wochenschrift*, 1880, No. 41, S. 545.

[4] Freund, "Ueber den heutigen Stand der Nachgeburtsbehandlung," *Archiv für Gynäkologie*, Bd. xxxi., S. 473.

Budberg,[2] as a modification of Credé's method, recommends that the fundus be pressed between the hands, so as to avoid causing a prolapse of the uterus. He warns against sudden withdrawal of the pressure. The placenta is expelled from the utero-vaginal region by pressure on the suprapubic region, or, as Freund recommends, by pressure on the lower uterine segment. By this modification, Budberg remarks, inversion of the uterus is impossible; the catheter is unnecessary, because the suprapubic pressure empties the bladder. Extreme force is not resorted to, and he recommends an expectant method; even to the waiting for two hours before concluding the third stage. The author cannot see any advantage to be gained by following this recommendation.

As ligature of the cord is not to be performed till pulsation has ceased, the ligature placed at the vulva as a guide to the descent of the placenta often becomes useless because of the lateness of its application (the passage of the placenta from the uterus, which it is meant to indicate, having already occurred).

As a modification the writer would suggest that instantly after birth of the child one tie be wrapped round the cord at the vulva, sufficiently tightly to retain itself in position without obstructing the circulation through the funis. Any descent of the placenta will then be more readily indexed.

Regarding the rise of the fundus during the third stage, Litzmann[3] describes two conditions accompanying the birth of the placenta. Where the labour has been rapid, and where the abdominal pressure has been powerful, the uterus sinks into the pelvis, and a lip of the cervix may present at the

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[1] Credé, *loc. cit.*, p. 176.

[2] Budberg, "Methode der Placentarexpression," *Deutsche Medicinische Wochenschrift*, 1898, No. 43, S. 683.

[3] Litzmann, *loc. cit.*, p. 28.

introitus. In the other set of phenomena described by him as occurring equally among primiparæ and multiparæ, the fundus rises over the placenta, reaching above the umbilicus, and the soft lower segment is distended by the placenta which is passing from the uterine cavity. The fundus becomes then a hard and movable body which ballottes in the abdomen, and when in this condition a little pressure on it will suffice to expel the placenta, so that, he adds, a slight traction on the cord is sufficient to remove it entirely. After expulsion the fundus falls. Such traction on the cord as advocated by Litzmann [1] and Spiegelberg [2] may or may not be beneficial, but with this exception Litzmann's method rests on the same principle as the present day one.

At the end of the second stage the fundus is situated 14 (Pinard, Schröder) or 15·5 cms. (Lüdecke [3]) above the pubes. It varies according to the—

1. Size of the child;
2. Quantity of the liquor;
3. Volume of the placenta;
4. Shape of the pelvis;
5. Condition of the bladder.

After separation of the placenta the fundus rises 4 cms. (Lüdecke), 4 to 5 cms. (Pinard), 6 cms. (Schröder), and after expulsion the fundus is generally 10 to 15 cms. above the pubes, being higher in multiparæ than in primiparæ (see p. 199).

Whether the uterus should be kept contracted during the passage of the after-birth or allowed to relax turns on the mode of, and has some bearing on, the separation of the membranes. Berry Hart,[4] indeed, emphasises the fact that the

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[1] Litzmann, *loc. cit.*, p. 28.

[2] Spiegelberg, *loc. cit.*, p. 23.

[3] Lüdecke, *loc. cit.*, p. 41.

[4] Hart, "Mechanism and Management of the Third Stage of Labour," *British Medical Journal*, 1901, vol. i., p. 153.

separation of the placenta is due to a disproportion between the placental area and the placental site; that it follows the elastic recoil and that the Credé method practised during the early period before the placenta has separated is dangerous. Pinard draws attention to the fact that the membranes may be adherent (usually at the fundus) though the placenta is occupying the lower uterine segment. He reports a case where a partial invertion of the uterus was caused by such adhesion of the membranes. Traction on the placenta was felt through the abdomen to produce an increase of the depression in the fundus, which had been caused by the descent of the placenta with traction on that part of the fundus to which the membranes were fixed. There can be no doubt that if the uterus be kept well contracted the membranes are more likely to be grasped and retained, than if after the expulsion of the placenta from the uterus a little relaxation is permitted before the membranes are sought to be withdrawn (see Dublin Method, p. 179). The possibility of difficulty in delivering the membranes will be present in primiparæ, for in them the uterus is more in a condition of continuous spasm than in multiparæ, though in multiparæ the actual pain produces a harder uterus (Pinard). The administration of ergot to hasten the expulsion of the placenta is bad, for it tends to cause the retention of the membranes, if not, indeed, of the after-birth itself. Such irregular contractions as may be produced by the action of ergot are readily observable from the abdomen.

Thus a too active management of the third stage, though it may hasten delivery of the placenta, is apt to conduce to retention of the membranes.

The difficulties which may be met with in expressing the placenta are :—

1. Hyperæsthesia of the abdominal wall.
2. Thickness of the abdominal parietes (fat, muscle in spasm, etc,).

3. Distended bladder.

4. Inflammatory affections of the pelvis.

5. Spasm of the os (due to ergot usually).

6. Return of the retractility of the cervix, where it has not been fully dilated, as in premature deliveries.

7. Adhesion of the placenta, including non-separation.

Atony of the uterus is best safeguarded against by the proper management of labour; but its onset is indicated by the relaxation of the fundus and the distention of the uterus with blood clot. A uterus full of clot has a most characteristic feeling.

Local contractions are very readily produced; they produce depressions on the surface of the uterus. Gerlach[1] has described a depression of the uterine wall, a concomitant of paralysis of the placental site, which was readily felt from the abdomen. Instead of being a hard area on the surface of the soft uterus the former situation of the placenta remained soft, while the rest of the uterus was firmly contracted and hæmorrhage was with difficulty controlled. Such non-contractile areas are fortunately uncommon. Besides entering into the cause of post-partum hæmorrhage they play an important part in the ætiology of spontaneous rupture of the uterus.

The following points in the management of the third stage of labour are to be noted:—

1. Follow the fundus down as the limbs are expelled.

2. Conduct the third stage with the woman on her back.

3. Be an observant spectator of, rather than an active participator in, the third stage, especially in primiparæ and such as have a lowly placed ("prolapsed") uterus.

4. Interfere only when abnormalities tend to present themselves, such as excessive hæmorrhage, etc.

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[1] Gerlach, "Ein Fall von Paralyse der Placentar-Insertionsstelle," *Münchener Medicinische Wochenschrift*, 1901, No. 11, S. 427.

5. When the placenta has left the uterus as evidenced by the various signs allow a little more relaxation of the uterus to facilitate separation of the membranes.

6. Without anything further than the gentlest of Credé's method (helping the pains) and an expectant supervision of the uterine contraction, the placenta usually leaves the cavity within fifteen minutes after the end of the second stage ; but it is to be understood that the lapse of fifteen minutes is not to be taken as a sign of the placenta having left the uterus, nor is it an indication for the expression of the after-birth.

7. Express the placenta from the vagina only when the bladder is empty and employ the minimum of force.

# CHAPTER XXIV.

SIGNS OF RECENT DELIVERY FROM THE ABDOMEN.

- Lines—Cicatrices—Pigmentation—Laxness—Recent Distention.
- Gap between the Recti—Intestinal Movement Visible.
- Palpation — Laxness—Puerperal Uterus — Appendages — Contraction under Manipulation—Up till Tenth Day.

INVOLUTION.

- A. INTRODUCTION.
- B. THE LOCHIA RELATIVE TO INVOLUTION.
- C. METHOD OF MEASUREMENT.
  - I. FALLACIES.
    - 1. Distention of the Bladder.
    - 2. Distention of the Rectum: (*a*) Acting Mechanically; (*b*) Acting through the Circulation.
    - 3. Malpositions of Uterus: (*a*) Latero-flexions; (*b*) Retro-displacements; (*c*) Ante-displacements; (*d*) Prolapse.
  - II. THE NORMAL CHART.
    - 1. Primiparæ.
    - 2. Multiparæ.
  - III. PHYSIOLOGICAL CIRCUMSTANCES INFLUENCING.
    - 1. General Health.
    - 2. Length of Labour.
    - 3. Age.
    - 4. Parity.
    - 5. Lactation and Suckling.
    - 6. Time of Day.
    - 7. Posture.
    - 8. Drugs: (*a*) Ergot; (*b*) Hydrastis; (*c*) Chloroform.
  - IV. PATHOLOGICAL LESIONS INFLUENCING INVOLUTION.
    - 1. Prematurity.
    - 2. Prolonged Labour.
    - 3. Distention of the Uterus with Blood-clot, etc.
    - 4. Retention of Membranes, etc.
    - 5. Sapræmia.
    - 6. Endometritis, etc.
  - V. AS A GUIDE TO DIAGNOSIS.
  - VI. AS A GUIDE TO TREATMENT.
  - VII. AS A GUIDE TO PROGNOSIS.
- D. CONCLUSIONS.

## THE SIGNS OF RECENT DELIVERY.

In its medico-legal aspect the examination of the abdomen is of some importance as affording indications of recent delivery. It will be sufficient, however, for the purpose the author has in view to give a very brief summary of the various signs of recent delivery:—

1. The lines in the abdomen due to the former distention, though less prominent, are still to be noted. Their redness, as a rule, quickly passes off. In primiparæ, after a few days, there may be little trace of them, but in multiparæ their presence is usually to be noted as numerous lozenge-shaped white cicatrices. Other distentions of the abdomen, such as rapidly growing tumours, will produce the same appearance. In many women these lines do not occur at any time.

2. Pigmentation of the skin or an exaggeration of pigment already there is frequently to be observed. In certain women who are dark complexioned the excess of pigmentation is often very marked; it will persist also for considerable periods, and in exceptional cases may appear almost to become permanent.

3. The skin of the abdomen is lax and wrinkled into folds, especially in the pluriparous.

4. The movements of the intestines are often visible, particularly in the gap between the recti muscles.

5. On palpation the lax condition of the abdominal muscles is more evident.

6. The enlarged uterus with the hypertrophied or thickened round ligaments and appendages gives the most significant sign. In many cases the uterus lies in either flank, and will be more or less readily recognised according to its degree of hardness. In some it is tender to manipulation. Friction induces a contraction, and this characteristic is diagnostic. The round ligaments are then also more easily made out on account of their partaking in the contraction. After the tenth day the abdominal examination, as far as concerns the uterus, ceases to be of importance.

# INVOLUTION.

## A. INTRODUCTION.

That the uterus which has been once gravid never returns to its virgin state is due probably to the accompanying stroma or scaffolding of fibrous tissue, which develops with the muscular structure; and probably the completely involuted puerperal uterus is larger than the original one, not on account of the remnants of muscle cells, but because of the connective tissue stroma, which is more or less of a new formation. This connective tissue is not absorbed as readily as the muscle substance, so that with each succeeding pregnancy the uterus becomes more and more of a fibrous structure and less and less of an elastic contractile organ. Rupture of the uterus is thus more prevalent in the pluriparous who have minor degrees of contracted pelvis. (In certain of these cases there is histologically a great diminution of elastic fibrous tissues.)

It is to be understood that many of the original muscle fibres will be destroyed along with those of more recent formation when involution begins. The fatty degeneration, which has already begun in the effete fibres, will be increased by the contracting and retracting muscle fibres shutting off the blood supply. (There is some question as to whether there is any fatty degeneration of the muscle fibres during involution. Thus Helme[1] has failed to find fat globules or granules in the involuting uterus of the rabbit. Ahlfeld,[2] however, remarks that a fatty degeneration is part of the process of involution, and that the larger the fat globules the quicker is the involution.)

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[1] Helme, "Histological Observations on the Muscular Fibre and Connective Tissue of the Uterus during Pregnancy and the Puerperium," *Transactions of the Royal Society of Edinburgh*, vol. xxxv., pt. 2, p. 1, 1890.

[2] Ahlfeld, *loc. cit.*, p. 151.

## B. THE LOCHIA RELATIVE TO INVOLUTION.

Absorption plays by far the most important part in the rapid reduction of the uterus.

The lochia may account for something in the human subject, but cannot be of much importance in other mammals, for in them the existence of a lochial flow was formerly doubted. Fleming[1] states that the lochia persist till the uterus has gained its prepregnant condition, and in the mare, cow, sheep, bitch, sow and cat the discharge is not continuous, and is proportionately much less than in the human subject. In such animals the lochia cannot account for the easy, rapid and efficient involution, although it may play a subsidiary part in the process.

It is very questionable whether the amount of the lochia has much to do with the rate of involution itself, though it cannot be doubted that a large amount of material is thereby removed from the uterine circulation.

Man is the only animal in whom parturition is accompanied by a hæmorrhage,[2] and probably the same vascular arrangements which initially permit the flow of blood, later on cause the lochial discharge.

The fatty debris contained in the lochia comes principally from the raw surface left after the separation of the placenta, and perhaps to a small extent from the general uterine surface; this depletion of the organ being a good safeguard against congestion. In parts remote from this secreting surface[3] the fatty debris formed from the uterine tissue must be removed by means of the venous and lymphatic circulation. It is only through the lymphatic channels that remotely situated material could enter the uterine cavity *viâ* the placental site, for like every raw surface this intra-uterine wound acts as an efficient drain.

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[1] Fleming, *Text-book of Veterinary Obstetrics*, London, 1896.

[2] Edwards, *Leçons sur Physiologie*, vol. ix., p. 592.

[3] Fleming (*loc. cit.*) writes that the uterus having been for long supplying nourishment to one or more fœtuses, it is not to be wondered at that it still continues post-partum a secretory function.

During the first few days when blood-vessels and lymphatics are open, the fluid removed from the uterine circulation is large in amount, but it is chiefly composed of blood. Later, as the vessels close, the discharge can only come from the lymphatics.

Matthews Duncan[1] states that the post-partum condition of the uterine cavity must not be reckoned to be the same as that of a surgical wound, nor the lochia to resemble the secretion from a healthy wound. From the examination of the discharges at corresponding times, (*a*) from the post-partum uterus, and (*b*) from the non-pregnant uterus after curettage, little difference is to be noted microscopically; and this is to be expected, for the placental site is neither more nor less than a granulating ulcer studded with islets of epithelium.

In time the lymphatics also become sealed,[2] and any subsequent discharge must be of the nature of a secretion from the uterine glands and transudation from the thinly covered capillaries, accompanied by diapedesis of the white cells and a few red corpuscles. These white cells quickly become fatty; indeed, they are already gorged with fatty granules previous to their arrival in the uterine cavity.

If the lochia contain the detritus of an involuting uterus, it follows therefore that the discharge from the uterus is an *effect* and not a *cause* of involution. It has been said that early cessation of the lochia is one of the causes of subinvolution; but Cazeaux and Tarnier[1] maintain that while the amount varies in different cases, an early cessation, if unaccompanied by severe inflammatory mischief, is favourable. Courty[2] mentions that he has noted cases where subinvolution existed with excessive discharge, which is perhaps the commoner combination of signs in such cases. If these two statements are to be reconciled the subinvolution of the uterus is not due, on the one hand, to the early cessation of the lochial flow; nor, on the other, to its excessive amount, but to some other causes which produce excessive or diminished discharge.

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[1] Duncan, "The Internal Surface of the Uterus after Delivery; its Analogies," etc., *British and Foreign Medico-Chirurgical Review*, N.S., 1853, vol. xii., p. 506.

[2] Probably the lymphatics as vessels become closed about the same time as the blood-vessels, but owing to their connection with the intercellular spaces they are indirectly open till the epithelium practically closes them. Of course, minute spaces remain normally between the epithelial cells.

Perspiration[2] is generally believed to reduce the amount, and nursing[3] has the same result. It seems to the author on these grounds that the quantity of the lochia, instead of being directly, is inversely as the rate of involution.

The small amount of discharge in animals may be due to the comparatively high position of the uterus relative to the circulation generally, while in the human subject, for mechanical reasons, congestion is more apt to be present. The lochia, as visible discharge, cease long before involution is complete. According to Cazeaux and Tarnier this takes place on the tenth day, while Giles[4] says it takes place on the ninth to the tenth day. Fehling[5] remarks that the lochia are seldom serous before the eleventh to the twelfth day, and that they are often sanious till the second or third week without harm resulting,

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[1] Cazeaux and Tarnier, *loc. cit.*, p. 31.

[2] Courty, *Dictionnaire des Sciences Médicales.*

[3] Cazeaux and Tarnier, Courty, *ibid.*; Lusk, *loc. cit.*, p. 20.

[4] Giles, "On the Lochia," *Transactions of the London Obstetrical Society*, 1893, vol. xxxv., p. 190.

[5] Fehling, *Die Physiologie und Pathologie des Wochenbettes*, Stuttgart, 1897; from Knapp, "Ueber die Berechtigung der Ausschabung der Gebärmutter bei verzögerter Rückbildung derselben im Wochenbett," *Archiv für Gynäkologie*, Bd. lv., S. 417.

*i.e.*, without delay in involution. A discharge from the uterus may be possible till such time as the epithelium closes the intercellular spaces.

The connection between the lochia and involution has been gone into more fully than the title of this chapter would suggest, but if the lochia were admitted to be a guide to involution, then the observation of their quantity would be more important than the measurement of the uterus. If the amount of the lochial discharge be no true index of the extent or completeness of involution, measurement of the uterus becomes all the more important as the only other available source of information.

The normal period during which involution takes place is variously given by different observers.[1] Theoretically the process will go on till the rehabilitation of the endometrium is complete. This is a process whose completion can be more accurately ascertained, and Lusk[2] gives it at from six to eight weeks. Mundé,[3] quoting Garrigues, says that after two months the fundus is about 3 cms. above the pubes; but that it can only be felt bimanually. Probably the time necessary is fully eight weeks.

## C. METHOD OF MEASUREMENT, ETC.

The method of estimating the rate of involution is that which has been fully described in a paper by Stevens and Griffith.[4] Briefly it may be described as follows:—

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[1] Smellie, eighteen to twenty days; Krause, five weeks; Hohl and Spiegelberg, eight weeks; Schröder and Velpau, six to eight weeks; Serkudoff, ten to twelve weeks; Scanzoni, eighteen weeks; Hansen, half the cases in two months and the other half in three months, while the quickest was in four weeks.

[2] Lusk, *loc. cit.*, p. 20.

[3] Mundé, *loc. cit.*, p. 4.

[4] Stevens and Griffith, "Notes on the Variation in Height of the Fundus Uteri above the Symphysis during the Puerperium, the Conditions which Influence this, and the Practical Conclusions which may be drawn from such Observations," *Transactions of the London Obstetrical Society*, 1895, vol. xxxvii., p. 246.

Taking the crest of the pubes as the fixed point, the fundus is located by palpation, and the distance measured by a ruler. For purposes of registration, the temperature chart is employed. Taking the line of 100° temperature to indicate the base, each degree of temperature represents an inch of possible fundus elevation. In this way the daily measurements may be charted with the temperature.

The measurements should be taken at the same hour daily; in the author's cases the time chosen was between eight and nine A.M., and eight and nine P.M. The usual precautions, such as having the bladder and rectum empty as far as ascertainable, the uterus in the middle line and hardened by the application of a little massage, must be taken.

Internal measurements must not be supposed to be more accurate, for, according to Serkudoff,[1] Temesváry and Bäcker,[2] they are liable to many misinterpretations, while being at the same time not free from danger. McCann[3] remarks that such measurements only give the depth of the cavity. Serkudoff also affirms that measurement of the breadth of the uterus is more reliable than the measurement of its length, while it is less liable to be misinterpreted.

This external measurement of the fundus elevation takes no account of the cervix; still, for practical purposes, it serves as a valuable index to the progress of the puerperium.

Chart No. 1, p. 197, and chart No. 2, p. 200, represent the curves in normal cases.

I. **Fallacies.**—There are a number of conditions which give rise to variations and irregularities in the curve, and their recognition is necessary for the proper estimation of the value of the chart. Of the possible misinterpretations or fallacies the more important are :—

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[1] Serkudoff, "Contributions to the Determination of the Diminution of the Uterus after Delivery," *Edinburgh Medical Journal*, 1875, vol. xx., p. 965.

[2] Temesváry and Bäcker, "Studien aus dem Gebiete des Wochenbettes," *Archiv für Gynäkologie*, Bd. xxxiii., S. 374.

[3] McCann, "On the Importance of the Examination of the Abdomen during the Puerperium," *British Medical Journal*, 1896, vol. ii., p. 192.

1. *Distention of the Bladder.*—This is a well-recognised cause of elevation of the post-partum uterus (even 70 cc. of retained urine effecting this).[1] The upward displacement of the uterus may be extreme (one case observed by the author before catheterisation measured 9½ inches, and after it, 5½ inches). Lusk,[2] citing Börner,[3] says the elevation by a distended bladder may be as much as 3½ inches. The bladder has such connection with the uterus that when it is distended it raises the fundus. The effect of this connection is also seen where the bladder is drawn up by a myoma in the anterior uterine wall, and a like result occurs in pregnancy.

2. *Distention of the Rectum.*—This has not been found by the author to make such a great difference as McCann[4] has noted. Pfannkuch has found the elevation, due to this cause, to amount to 2·25 cms. It probably acts in two ways: (*a*) *mechanically*, where the loading of the rectum is excessive; (*b*) *through the circulation*, by producing congestion. Constipation produces a gradual rise, while its relief produces usually a rapid fall, though not always.

Were the displacement due to the mechanical action alone, the emptying of the rectum, like the similar procedure in the bladder, would always effect an immediate lowering of the fundus. That the mechanical action plays the greater part in this displacement is indicated by the fact that when a purge is administered the uterus often gradually rises (due to the gradual filling of the rectum), till evacuation of the bowel causes a sudden drop (see chart 5, p. 210). The administration of an enema has the same effect.

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[1] Pfannkuch, *loc. cit.*, p. 34.

[2] Lusk, *loc. cit.*, p. 20.

[3] Börner, *Ueber den Puerperalen Uterus*, Graz, 1875.

[4] McCann, *loc. cit.*, p. 194.

3. *Malpositions of the Uterus.*—(*a*) Lateral deviation is the chief fallacy under this head. It is due, according to Schneider,[1] to distention of the bladder taking place towards the right, thus pushing the lower uterine segment towards the left, and thereby causing the fundus to fall towards the right. This produces a latero-flexion to the right, which is the commoner. The same author cites an experiment by Dr. Kehrer, of Giessen, where distention of the bladder of a drowned puerperal woman always caused the uterus to lean towards the right. Croom[2] in his monograph states that the uterus should be mesial if the bladder and rectum are empty. He thinks that the bladder usually distends to the right and displaces the uterus to the left (or if the displacement is to the right, it is due to a previously existing lateral flexion during pregnancy, which is secondary to a loaded rectum; the displacement towards the left being due to the distended bladder and to left lateral decubitus).

Pfannkuch[3] in his article says that the uterus during the puerperium retains the same right flexion and rotation which had already developed during fœtal life. Herman and Fowler[4] state that this lateral flexion is due to cubitus; and in one case observed by the author, where the fundus was 8 inches from the symphysis, it certainly gravitated to the under side; this tendency is increased by the loading of the rectum and the lateral decubitus. Milne Murray[5] has referred to it as having a connection with occipito-posterior positions.

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[1] Schneider, "Beobachtungen über die Verkleinerung des Uterus in den ersten acht Tagen des Puerperiums," *Monatsschrift für Geburtskunde*, Bd. xxxi., S. 357.

[2] Croom, *A Study of the Bladder during Parturition.*

[3] Pfannkuch, *loc. cit.*, p. 34.

[4] Herman and Fowler, "On the Effect of Ergot on the Involution of the Uterus," *Transactions of the London Obstetrical Society*, 1888, vol. xxx., p. 85.

[5] Milne Murray, *loc. cit.*, p. 32.

(*b*) Retroversion and flexion, where not excessive, by causing the uterus to fall backwards, will give rise to a relatively high measurement which, when ascertained, must be discounted.

(*c*) Anteversion, and particularly anteflexion, will reduce the measurement, but the presence of either is of no import apart from contracted pelves, or separation of the recti.

(*d*) Prolapse of the uterus will, of course, cause a lowering of the fundus, but this also must be discounted.

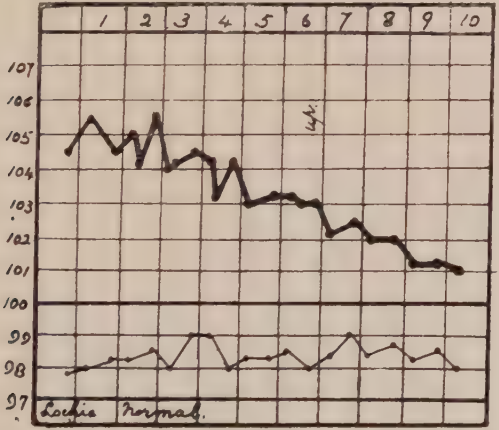

Chart No. 1. -Normal Primiparous Chart, from a primipara, *æt.* twenty-seven ; measurements taken immediately after wakening in the morning, and again at 9 A.M. and 9 P.M. The forceps were applied under chloroform anæsthesia, infant suckled.

**II. The Normal Chart.**—1. *Primiparæ.*—After expulsion of the placenta the fundus stands on an average four inches above the pubic crest. Within the next eighteen hours the uterus relaxes and the fundus may indicate a rise of from one to two and a half inches.[1]

Börner[2] appears to think the rise abnormal, while Temesváry and Bäcker[1] state that the average is three-quarters of an inch and that the fundus becomes also broader.

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[1] Schneider, *loc. cit.*, p. 196; Serkudoff, *loc. cit.*, p. 194.

[2] Börner, *loc. cit.*, p. 195.

Schröder[2] asserted that this was due to distention of the bladder, and Pfannkuch[3] maintains that the rise, where not due to bladder distention, is due to filling of the uterus with clot. He remarks that such elevation of the fundus produced by distention of the bladder has no tendency to induce post-partum hæmorrhage or delay involution. Lusk[4] says this primary rise, where not pathological, is due to bladder distention, while Schneider[5] states that it is not due to bladder distention, and in this he is supported by Serkudoff.[6] There can be no doubt that though the distending bladder raises the fundus it is not accountable for this almost constant primary rise, nor is it due to filling out of the uterine cavity with blood-clot; but it is probably owing to a relaxation of the muscle fibres and filling out of the blood sinuses with clot. After this there is a gradual though remitting fall till the fundus disappears into the pelvis.[7] The uterus may be said to be a pelvic organ when the fundus descends beneath the plane of the brim. Unless, however, the uterus be well anteflexed it may easily be felt in some cases as if it were still above the symphysis, even though completely involuted. (Courty[8] says that if the abdominal walls are relaxed and flaccid the completely involuted uterus can sometimes be felt.) The pelvic inclination is such that the sacral promontory lies three and a half inches above the pubic crest.[1] Barbour[2] puts it down at 2·5 to 5 inches. Dakin[3] notes in his book: "According to the evidence of frozen sections it (the fundus) lies at or below the level of the brim by the sixth day; it can, of course, be felt above the pubis for many days after, unless it is retroverted".

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[1] Temesváry and Bäcker, *loc. cit.*, p. 194.

[2] Schröder, *Schwangerschaft, Geburtshülfe und Wochenbett*, S. 187.

[3] Pfannkuch, *loc. cit.*, p. 34.

[4] Lusk, *loc. cit.*, p. 20.

[5] Schneider, *loc. cit.*, p. 196.

[6] Serkudoff, *loc. cit.*, p. 194.

[7] Börner says this takes place after nine and a half days; Wieland and Schneider, from the tenth to the twelfth day; Lusk and Jardine, the tenth day; Depaul, after the eleventh day; Courty, usually after the thirteenth day; Galabin, after the second week; Auvard, difficult to appreciate after the second week; Playfair, the eighteenth day; Spiegelberg, the third week.

[8] Courty, *loc. cit.*, p. 192.

A fundus entirely below the plane of the brim appears by this method of mensuration, if its natural anteflexion be not present, to be situated higher up than one lying above the brim but nearer the pubes.

Therefore after the eighth to the tenth day, or perhaps even earlier, little reliance can be placed on measurement of the uterus by the external method.

Stevens and Griffith[4] have noted that there was a regular diurnal variation—the morning measurement being higher than that of the preceding evening. McCann[5] makes the same remark. In his own practice the author has observed rather the reverse, but the subject will be referred to later (see p. 203).

2. *Multiparæ.*—In them the involution curve is pitched about half to one inch higher than in primiparæ (see chart No. 2). According to Schröder and Scanzoni,[6] and Temesváry and Bäcker,[7] involution is more regular in multiparæ, while Jocelin, Cazeaux, and Wieland[8] believe the reverse to be the case. Serkudoff[9] states

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[1] Quain, *Anatomy*, tenth edition, p. 117.

[2] Barbour, "On the Position of the Promontory of the Sacrum as Shown by Frozen Sections," *Transactions of the Edinburgh Obstetrical Society*, vol. xxiii., p. 142.

[3] Dakin, *loc. cit.*, p. 48.

[4] Stevens and Griffith, *loc. cit.*, p. 193.

[5] McCann, *loc. cit.*, p. 194.

[6] Schröder and Scanzoni, *Lehrbuch der Geburt*, S. 355.

[7] Temesváry and Bäcker, *loc. cit.*, p. 194.

[8] Wieland, "Étude sur l'evolution de l'uterus pendant la grossesse et sur le retour de cet organ a l'étât normal après l'accouchement," *Thèse de Paris*, 1858.

[9] Serkudoff, *loc. cit.*, p. 194.

that while being more regular in primiparæ it is slower; while Knapp[1] says that it is quicker in multiparæ, but not so complete. The author has found the larger multiparous uterus to involute more rapidly than the primiparous during the first week only. This probably takes place because there is more to involute.

**III. Physiological Circumstances Influencing Involution.**—1. *General Health.*—Measurement of involution formed the subject of a paper read before the Glasgow Obstetrical and Gynæcological Society,[2] held in January, 1900. In the discussion following, Dr. W. L. Reid recorded his experience as showing that the rate of involution was much influenced by the state of the body generally, and that, for instance, during pneumonia involution was retarded. Temesváry and Bäcker[3]

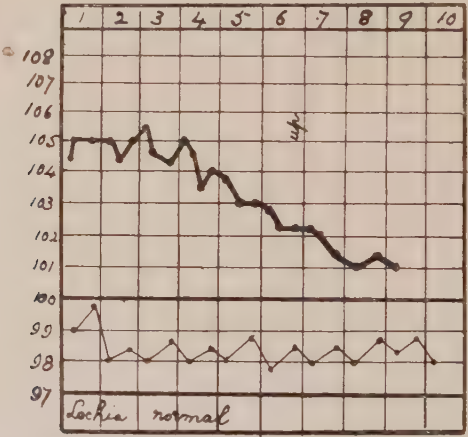

Chart No. 2.—Normal Multiparous Chart, from a II para, infant suckled. Measurements taken as in No. 1 (rather low).

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[1] Knapp, *loc. cit.*, p. 192.

[2] MacLennan, "Measurement of Involution of the Uterus, with Nine Charts," *Glasgow Medical Journal*, April, 1900.

[3] Temesváry and Bäcker, *loc. cit.*, p. 194.

show that rise in temperature hastens involution. Knapp[1] finds it more rapid in the healthy, and Leopold[2] finds the mucous membrane better renewed and developed in the healthy.

2. *Length of Labour, Loss of Blood, etc.*—Knapp affirms that the uterus returns to its normal size less quickly after instrumental delivery and in all cases where the hand was inserted in the uterus ; it is probably on account of the increased length of labour that this has been noted by Knapp. The duration of labour will directly influence the tone of the uterus, besides more indirectly lowering the general tone. Loss of blood will diminish the strength of the circulation, as also the tone of the uterine muscle.

3. *Age.*—The more youthful the primipara the quicker and more complete is involution. Absorption is certainly much more active in the young. Even in quite young females the uterus involutes well.

4. *Parity*, which has already (see p. 197) been referred to, is naturally much associated with age.

5. *Lactation and Suckling.*—Most writers[3] maintain that at the onset of lactation, occurring about the third day, there is a pause in involution ; this may well be accounted for by the general disturbance which accompanies the onset of lactation. After this period it becomes a question of suckling. Temesváry and Bäcker[4] think that involution is hastened by suckling, and they say this is the general opinion in Germany. They remark further that involution is greatest on the second and third day in primiparæ, and between the first and second

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[1] Knapp, *loc. cit.*, p. 192.

[2] Leopold, "Studien über die Uterusschleimhaut während Menstruation, Schwangerschaft und Wochenbett," *Archiv für Gynäkologie*, Bd. xii., S. 417.

[3] McCann, when discussing Stevens and Griffith's paper, said that lactation at first hastened but later diminished involution ; Courty, *loc. cit.*, p. 192.

[4] Temesváry and Bäcker, *loc. cit.*, p. 194.

day in multiparæ, *i.e.*, about the time when the onset of lactation is to be expected. Milne Murray[1] says non-lactation is one of the signs of subinvolution; while Tilt[2] thinks uterine troubles are greater in those who do not suckle. Serkudoff[3] declares that suckling delays involution during the first four days, but that it subsequently quickens it. McCann, Schröder and Schneider hold that involution is more regular in those who nurse their children. Suckling is known to produce uterine contraction, and there is a general belief that it tends to increase the after-pains, though the author has not been able to convince himself of this. Suckling in all cases will physiologically produce uterine contraction, but why is pain only present occasionally? Is the pain not a pathological feature? Late post-partum uterine contractions should not cause pain. The pains may be caused by other circumstances, and the suckling may increase the severity of the contraction, but will not increase the number of the after-pains. After-pains are so frequently present in those who do not suckle their children that another explanation seems necessary. The after-pains are usually more severe where involution is tardy, as in endometritis and in the pluriparous. Dakin[4] remarks that after-pains are more liable to occur in the case of uteri which allow clots to form and in which the power of expulsion is feeble. Serkudoff says the after-pains favour involution, and with this statement Temesváry and Bäcker agree. It is difficult to conceive how a condition, chiefly occurring among the pluriparous, whose uteri are more or less fibrous structures, and in recognised pathological states, could hasten involution or even accompany (in the majority of cases) rapid involution.

During lactation a special demand is made on the nutritive reserves of the system; the tissues are depleted and the involution is probably hastened by the requirements they make on the nutritive elements of the blood. It is a well-known fact that during lactation decay in the teeth is apt to advance rapidly, and that the extra weight gained during gestation is quickly lost. The detritus from the involuting uterus will be utilised in the production of the lacteal secretion. Suckling by removing fluid from the system is said also to lessen the lochia (Cazeaux and Tarnier), with this also the writer agrees. It is interesting to note in this connection that after Porro's operation there is often an absence of milk from the breasts.[1]

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[1] Murray, *loc. cit.*, p. 32.

[2] Tilt, "On the Treatment of Defective Uterine Involution," *Lancet*, 1876, vol. ii., p. 217.

[3] Serkudoff, *loc. cit.*, p. 194.

[4] Dakin, *loc. cit.*, p. 48.

6. *Time of Day.*—Stevens and Griffith [2] found the morning measurement was usually higher than that of the foregoing night. The author found the reverse to be the case. It may be accepted, as Stevens and Griffith say, that after sleep the uterine muscle is in an atonic condition, and if measurement is taken shortly after awakening the uterus may not contract under massage to the same extent as on the previous night. If, however, a longer interval be allowed to elapse, the beneficial effect of sleep may be noticed in the renewed vigour of the uterine muscle, and contraction may be more effective than on the previous evening. All the cases under the author's observation had been awake some considerable time before measurements were taken, and the uterine muscle had thus time to recover from the atonic condition of sleep.

In a more recent experiment, the measurement of the fundus has been attempted immediately after the woman awakened; and though a somewhat difficult investigation to carry out properly, the general result of the experiment seems to show that the uterus is relaxed during the hours of sleep, but that it soon recovers more than it has lost (see chart No. 1, p. 197, and chart No. 2, p. 200).

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[1] Sinclair, "A Series of Ten Successful Cases of Cæsarean Section," *Lancet*, 1901, vol. i., p. 161.

[2] Stevens and Griffith, *loc. cit.*, p. 193.

7. *Posture.*—Whether the woman is confined to bed or is going about is a matter of some importance.

The uterus is not completely involuted, on the average, for eight weeks. Should the patient be kept in bed for this time? Why is ten to fourteen days fixed as about the best length for the lying-in period? The mucous membrane in some cases has been found by Leopold[1] to be almost completely restored in nine days. Is there any method which would indicate the state of matters in the uterus, or does the size of the uterus indicate the degree of completeness of the restoration of the puerperal uterus to its involuted state? In the Maternity Hospital in this city the patients were allowed up usually on the sixth evening, and in most cases involution, as ascertained by measurement, was slightly delayed. Provided there is no pathological lesion, rising before the fourteenth day, or before the process of involution is well advanced, is detrimental. After this period continued rest will be harmful and likely to interfere with the general health. When the uterus has become sufficiently small, so as to make it extremely unlikely that a displacement would take place on account of its augmented weight, then the moving about of the patient will stimulate absorption and diminish the constipation, which otherwise often becomes troublesome. The continuance of the dorsal decubitus at the time when the fundus reaches the promontory, and is about to become a pelvic organ again, will be apt to induce a retroflexion; at this period, then, it is better for the patient to rise. In this way an indication as to when the patient should rise is given by measurement from the abdomen of the rate of involution.

The examination of the uterus by palpation gives thus a good guide as to when it is safe for the rigour of the confinement to be relaxed.

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[1] Leopold, *loc. cit.*, p. 201.

In the *Clinical Journal*, September, 1899, the views of a number of German authorities on this subject are given. Küstner advises rising on the fifth day, but abstaining from all work. Olshausen disapproves of this, and thinks displacement would be more liable to occur. Schatz says the pelvic floor regains its normal state after prolonged rest, and he disapproves of the early rising. Brützer[1] recommends early rising in the puerperium, in some cases even on the second day, in others, on the third or fourth. The time these women are allowed up is short to begin with, but is gradually increased. Keiffer[2] says subinvolution may be the result of rising too soon; while Charles[3] is in favour of the woman getting up for two hours daily, as conducing towards involution, though the full duties must not be renewed before six weeks have elapsed. Occasionally the advantages to be gained by early rising from bed induce one to recommend it, but in these cases hæmorrhage is usually increased; where depletion is indicated this feature may be beneficial. A median course should be steered between the extremes, and the various signs available for guidance should be considered before deciding what to recommend.

8. *Drugs.*—(*a*) Ergot: the action of ergot on involution is a disputed point. No doubt it causes contraction of the gravid uterus. Herman and Fowler[4] found that to aid involution the continuous administration of ergot was better than a single dose, but that it had no effect on the duration of the lochia.

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[1] Brützer, "Ein Beitrag zur Wochenbettsdiätetik," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1897, Bd. xxxvii., S. 391.

[2] Keiffer, *La Flandre Médicale*, Juin 13, 1895; from the *Annual of the Universal Medical Sciences*, Sajous, 1896.

[3] Charles, *ibid.*

[4] Herman and Fowler, *loc. cit.*, p. 196.

In the discussion which followed the statement of these views, Dakin denied to ergot any beneficial influence whatever. (*b*) Hydrastis: the writer has frequently given this drug for a flabby puerperal uterus with apparent success; but his experience of it is not large enough to justify any dogmatic statement. Bordé[1] thinks the drug worse than useless. (*c*) Chloroform: this, according to Schneider, retards involution. Probably, as now given in small quantity, of purer quality, and for the relief of pain, its influence on involution has been reduced to the vanishing point; in all probability it is the manipulation done under the anæsthetic, or the necessity for it, which delays involution. The author has unfailingly found in operative cases done under chloroform, antiseptically and aseptically, that involution was not delayed, though Knapp thinks that during the first week the influence of chloroform is detrimental.

**IV. Pathological Lesions Influencing Involution.**—1. *Prematurity.*—This occurrence, as a detrimental factor in involution, is not due to the uterus being emptied before full time; but the cause of the abortion, miscarriage, or premature labour is also the cause of the delayed involution. In induction of premature labour delay in involution is not to be noticed. Hansen[2] remarks that involution is slower after premature birth; with this unqualified statement the author cannot agree.

2. *Prolonged Labour.*—There can be no doubt that a prolonged delivery delays involution, but in any of these cases it is difficult to allocate the damage to the actual delay or to the accompanying interference, manual or instrumental. Where the woman is exhausted the uterus cannot be in the same

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[1] Bordé, *Year Book of Treatment*, 1893, p. 370.

[2] Hansen, "Ueber die puerperale Verkleinerung des Uterus," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1886, Bd. xiii., S. 16.

tonically contractile state as it would be under other circumstances, and more blood will be allowed to clot in the uterine sinuses. Excess in the amount of blood lost will tend to develop inertia of the uterus also, though perhaps to a less extent than is produced in tedious labour, over-distention of the uterus, etc.

3. *Distention of the uterus with blood clot, lochia, etc.*—These conditions, unless extreme, may not be strictly pathological; still they are best considered under this section. The uterus in old multiparæ being less elastic is more easily distended by collections of discharge. Besides this factor the uterine wall itself may show a great diminution in retractility, and instead of expelling discharge, permit it to collect in the cavity. After-pains are especially prominent in these cases. In the earlier days the blood coagulates and the presence of the clots gives rise to a certain amount of irritation; the blood clots do not cause the distention, but their presence is merely an accompaniment of an atonic condition. Digital excitation of the fundus through the abdominal walls, by stimulating contraction, generally suffices to expel such collections from the uterus. At the same time, such manipulations cause a substantial shrinkage in the size of that organ.

4. *Retention of membranes, etc.*—According to Fischer,[1] involution is hindered by forcible expulsion of the placenta, and this will be due to retention of parts of either membrane or placenta. On examination of the afterbirth, the absence of any considerable portion of either placenta or membranes can usually be readily ascertained, and the proper treatment at once instituted. Small pieces of placenta remaining may eventually become placental polypi, and give rise to trouble in the future. Their genesis is commonly determined by an improper conduction of the third stage; their presence can only

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[1] Fischer, *loc. cit.*, p. 180.

be presumed from the symptomatic hæmorrhage and from the failure on the part of the uterus to completely involute. Should there, however, be any suspicion of small pieces having been retained, the fact should be noted for future consideration, as abnormalities may supervene during the puerperium. Such small pieces of membrane, and sometime even larger pieces, have little influence on the size of the uterus at the time, though later on, if they become infected, their presence markedly delays involution.

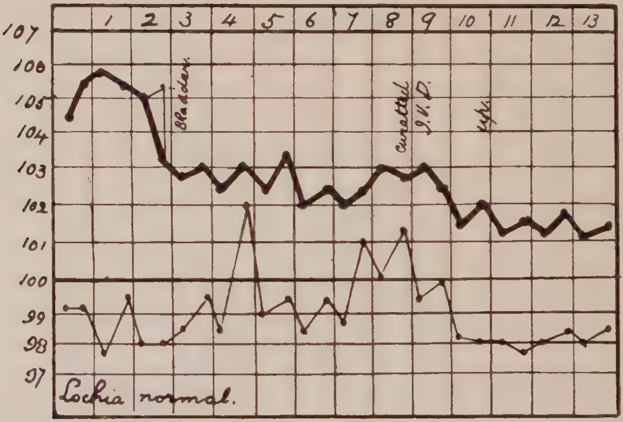

Chart No. 3.—Sapræmia, primipara, *æt.* twenty, curettage and douche beneficial. Measurements at 9 A.M. and 9 P.M. (See also charts Nos. 7, 8, 9 and 10, pp. 212-214.)

5. *Sapræmia.*—This pathological state develops as a sequence of the previous conditions. If during the third stage of labour proper precaution [1] is not taken to prevent air entering the uterus, the unavoidable clots, shreds, etc., become culture media for saprophytic germs, and a certain amount of fever takes place during the first week of the puerperium. The lochia show also a tendency to become fœtid. There is,

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[1] Jellet, *loc. cit.*, p. 58; Hart, *loc. cit.*, p. 183.

perhaps, some haziness of meaning attached to this term, but by sapræmia is here meant a toxæmia from the products formed by saprophytic organisms which penetrate and infect only the *contents* of the uterine cavity. How far this pathology is strictly correct is a matter of doubt; and it is affirmed by some that the condition does not exist without, at the same time, there being superadded a pyogenic infection. Without entering upon the pathology of puerperal fever and discussing its nomenclature, for clinical purposes the name suffices to indicate a well-defined condition which yields to treatment. There is erratic fever, often fœtor of the lochia (which may either be increased or diminished), a large flabby uterus, contraction of which usually gives rise to pain.

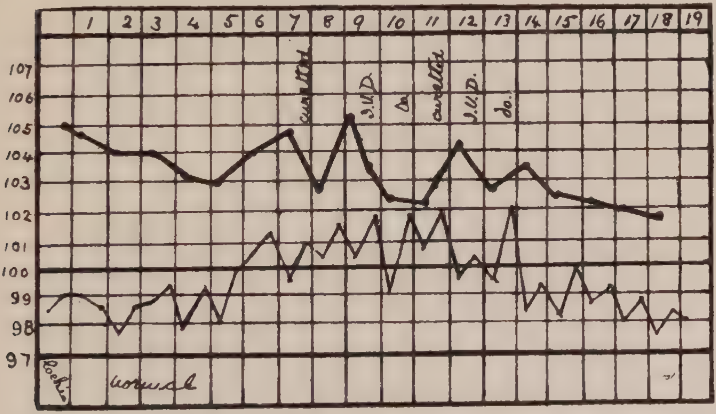

Chart No. 4, belongs to a primipara, *æt.* twenty, who had a septic endometritis.

6. Endometritis (see chart No. 4), metritis, septic thrombosis, cellulitis (chart No. 5, p. 210), salpingitis, peritonitis, or a general septicæmia:—

These all stop or hinder involution. Such conditions merge into one another in most cases. With the exception of endometritis and metritis, the simpler and more localised the lesion the less effect is there on involution. Endometritis causes a large increase in the size of the uterus. Generally there is, in any one serious case, a combination of three or more of these lesions. As a rule, the temperature rises out of all proportion to the rise of the fundus.

**V. As a Guide to Diagnosis.**—Charting the height of the fundus is of great help, up to a certain point, in diagnosing the various pathological lesions. Taken in conjunction with the temperature and other symptoms and signs, it helps to separate the good from the bad cases. Thus, if there is no change in involution, it is evident the mischief which causes the fever is not uterine. Chart No. 6 shows a case where there was no lesion in the pelvis from first to last; a suspicion of phthisis existed.

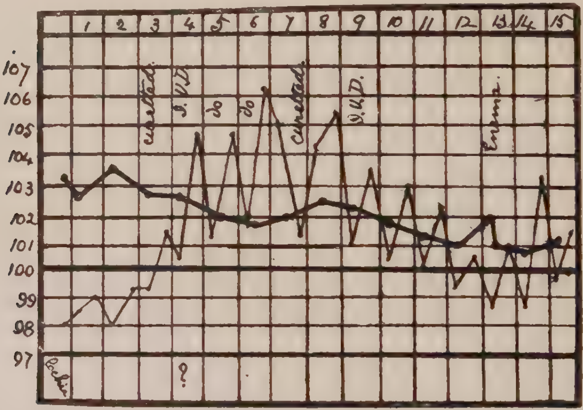

Chart No. 5, belongs to a primipara, *æt.* twenty, who eventually developed cellulitis.

A rise in the fundus without a rise of temperature, points to a mechanical cause for the elevation.

A rapid rise in the temperature with a gradual, though progressive rise in the fundus measurement, is indicative of irritating contents in the uterus (sapræmia).

A high fever with little, but sustained, rise in the height of the fundus, indicates, besides mischief *in* the uterus, a more serious lesion outside of it.

The late Dr. MacHarg kindly gave the writer his journals relating to puerperal fever cases in Belvidere Fever Hospital, Glasgow ; from the uterine measurements with the sound of these cases it is evident that the greatest increase in size is found in cases of endometritis, while cellulitis, septic thrombosis, etc., although evidently delaying involution, did not do so to anything like the same extent. These cases formed the subject of his Thesis for M.D., and a *résumé* of them was published in the *British Medical Journal*.[1]

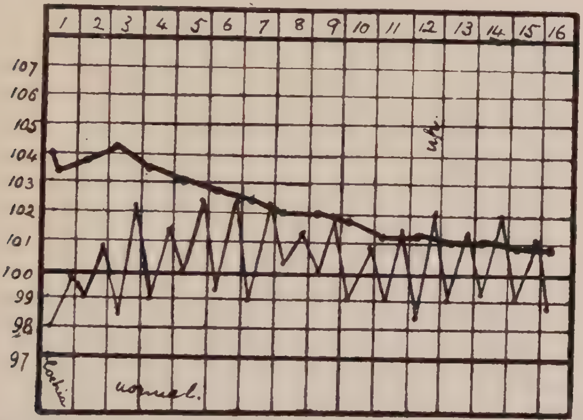

Chart No. 6, refers to the puerperium of a primipara, *æt.* twenty-three, who had no pelvic lesion at all.

The measurements there given corroborate the observations made from the abdomen.

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[1] MacHarg, "An Analytical Account of Fifty-seven Cases of Puerperal Infection," *British Medical Journal*, 1900, vol. i., p. 373.

**VI. As a Guide to Treatment.**—Some reference has already been made to the effect of certain procedures on involution. In mentioning posture, too early rising was deprecated, except where a pathological lesion existed. The condition

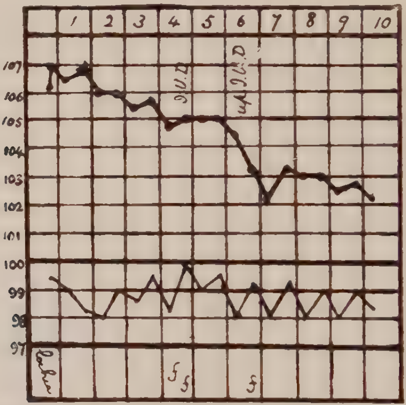

Chart No. 7.—This chart refers to the puerperium of a II. para., *æt.* twenty-four, whose condition was diagnosed as sapræmia.

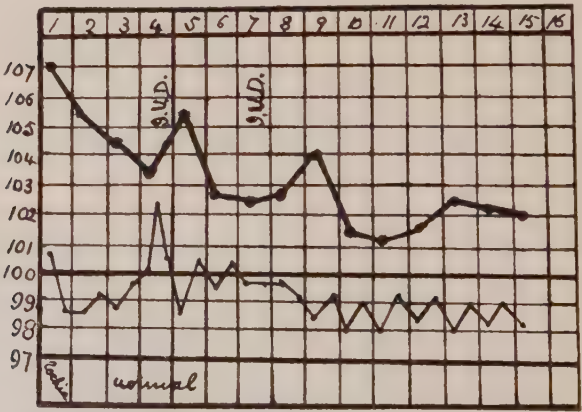

Chart No. 8.—The patient was a primipara, *æt.* twenty.

referred to was sapræmia. Getting up early then is beneficial. Chart No. 7 shows the result of the intra-uterine douche (I.U.D.), combined with the erect posture. By this means better drainage is ensured (see chart No. 10, p. 214).

The effect of ergot has already been referred to. There can be no doubt that the administration of this drug (as a standardised preparation), systematically or repeatedly, in a case where the uterus is large and feels flabby, will prevent an undoubted pathological condition from developing, and may save future operative measures, such as the intra-uterine douche or curettage.

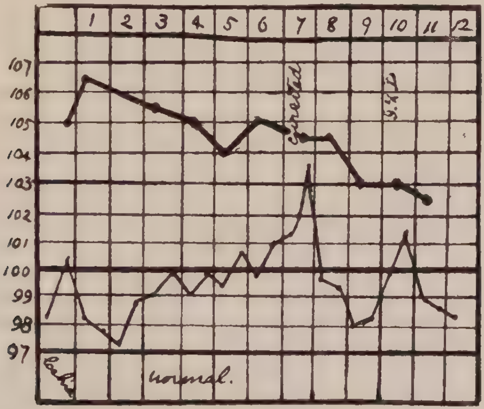

Chart No. 9.—This chart was that of a primipara, *æt.* nineteen, who was known to have retained membranes; note the rise in temperature after curettage.

A rise in temperature, accompanied by a corresponding rise in the height of the fundus, is always suspicious. If the diagnosis points to sapræmia from blood clot, a simple hot intra-uterine douche followed by the administration of ergot, quinine, etc., is indicated. Chart No. 8 shows a case where the rise in temperature, which was due to sapræmia, was accompanied by a corresponding rise of the fundus, and which was much benefited by the intra-uterine douche. Operative interference with the puerperal uterus usually causes a temporary rise in the height of the fundus and the temperature, but both usually fall lower than before within the next twelve hours provided the operation has been the correct one.

Should retained membranes be at the root of the trouble, the blunt flushing curette (Rheinstadter's) may be employed *bimanually* with benefit (see chart No. 9).

The next chart shows a case where the curette was indicated and where its employment likewise did good.

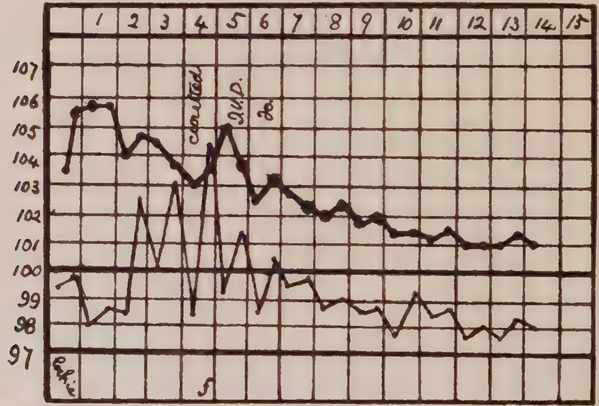

Chart No. 10.—Case of sapræmia in a primipara, *æt.* twenty-eight.

The operation of curettage is, however, of very limited application. Should the pathological condition be beyond that known as sapræmia, and should the living structures of the uterus be involved, the curette is harmful. Chart No. 5 (p. 210) shows such a case where the curette was contra-indicated (high temperature without a corresponding rise in the height of the fundus). Curettage here was performed without benefit. As a gynæcological operation, curettage is the usual treatment for subinvolution following delivery, which may be due to retained products of conception. The curette therefore is the best treatment for incomplete abortion before the condition of subinvolution comes into existence, *i.e.*, as a prophylactic against it. Similarly also when retained products of conception are suspected, and a tendency to sapræmia exists, curettage lowers the height of the fundus, and is thus a prophylactic against subinvolution.

Knapp[1] is the only writer who has drawn attention to the bearing of the height of the fundus on the question of treatment.

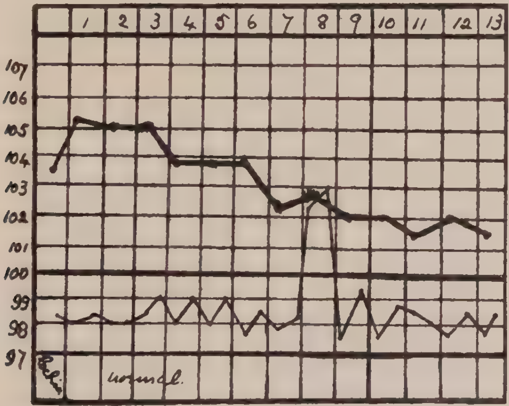

Chart No. 11.—This chart belonged to a primipara, *æt.* twenty-three.

He has written that if the fundus stands between the pubes and the umbilicus on the seventh to the eighth day, then curettage is indicated: the writer would say that an intra-uterine douche or douches was the proper treatment if no other indications were to be considered.

The discussion of the treatment of the severer forms of puerperal fever would be too great a digression and the measurement of involution has little bearing on it; but it may be said that where the rise of the fundus is well marked the question of hysterectomy (because of the probability of septic endometritis) should be considered.

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[1] Knapp, *loc. cit.*, p. 192.

**VII. As a Guide to Prognosis.**—Measurement of involution is of great help in determining the prognosis. A couple of charts will illustrate this. Chart No. 11 shows a sudden rise in temperature, yet the involution chart line gave no sign of anything wrong. The prognosis was therefore correspondingly good. Chart No. 12 indicates a considerable rise in temperature on the third to the fifth day without a corresponding rise in the fundus line, so here again the prognosis was favourable though the diagnosis was uncertain. In all probability the cause was the onset of lactation, accompanied by rather more than usual constitutional disturbance. No further treatment than administration of a dose of quinine with attention to the breasts was required (see also chart No. 6, p. 211).

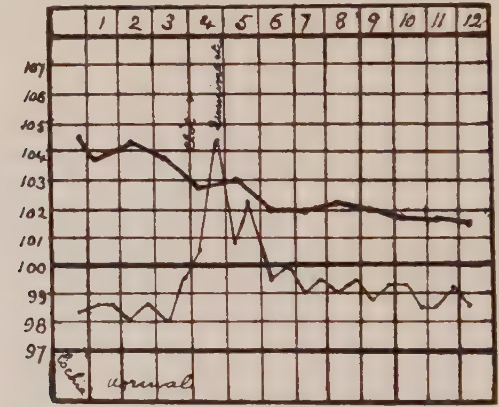

Chart No. 12 was that of a primipara, *æt.* sixteen.

The suspicion of a bad prognosis suggested by the consideration of the temperature alone is corroborated if it is found that the uterus shows a slight and maintained rise.

A large rise in the fundus curve would, on the other hand, improve a prognosis which from the temperature had been regarded as unfavourable. The case represented in chart No. 5 (p. 210) was one of pelvic cellulitis, and would have indicated a bad prognosis had the fundus not shown that involution was not quite inhibited. In many cases the measurement of the fundus becomes as good an index to the prognosis of the lying-in period as the thermometer.

## D. CONCLUSIONS.

Finally, the daily registration of the rate of involution is advocated for the following reasons. The hardening of the uterus from external digital manipulation can do nothing but good, and the heights when charted give indications for:—

1. The administration of purgatives, ergot, etc.
2. When it is safe and advantageous to allow the patient to rise.
3. The intra-uterine douche (I.U.D.).
4. Curettage.
5. Diagnosis, treatment and prognosis, regarding which there has been hitherto too little attention paid. Practically no literature to which the writer has had access, with the exception of the paper by Knapp,[1] looks at this subject from the point of view either of diagnosis, treatment or prognosis.

Further experience has only deepened the conviction that the charting of the heights of the fundus at the various epochs is of the very highest value and should never be omitted.

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[1] Knapp, *loc. cit.*, p. 192.

# BIBLIOGRAPHY AND BIBLIOGRAPHICAL INDEX.

PAGE

Abbot, "Cephalic Version by External Manipulation in a Case of Foot Presentation," *Boston Medical and Surgical Journal*, 1871, N.S., vol. vii., p. 351 . . . . . 161

Ahlfeld, *Abwartende Methode oder Credé'scher Handgriff*, Leipzig, 1888 . . . . . . . . . . 180

—— "Bestimmungen der Grösse und des Alters der Frucht vor der Geburt," *Archiv für Gynäkologie*, Bd. ii., S. 353 . . . . . . . . . . . 23, 34, 91

—— "Die Bedeutung der äusseren Untersuchung der Gebärenden," *Deutsche Medicinische Wochenschrift*, 1896, No. 44 . . . . . . . . . . 4, 8, 58

—— "Die Technik der Schwangern Untersuchung," *Volkmann's Klinische Vorträge*, No. 79 . . . . . . 23

—— *Lehrbuch der Geburtshülfe*, zweite Auflage, 1898, S. 89, Leipzig . . . . . . . . . 151, 180, 189

—— *System of Gynæcology and Obstetrics by American Authors*, vol i., part 1, p. 56 . . . . . . . . . 17

—— "Zur Diagnose der Zwillingschwangerschaft," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1896, Bd. xxxv., S. 180 . . . . . . . . . . . . . 18

Ashwell, *On Parturition*, p. 127 . . . . . . . . . 142

Attensamer, Inaugural Dissertation, Würzburg, 1885 . . 98

Auvard, *Travaux d'obstétrique*, Paris, 1889, t. iii. . 29, 31, 33

Barbour, *Atlas of the Anatomy of Labour*, plate ix. . . . 110

—— "On the Position of the Promontory of the Sacrum as Shown by Frozen Sections," *Transactions of the Edinburgh Obstetrical Society*, vol. xxiii., p. 142 . . . . 199

—— "The Anatomy and Relations of the Uterus during the Third Stage of Labour and the First Days of the Puerperium," *Transactions of the Edinburgh Obstetrical Society*, 1884, vol. ix., pp. 88, 89 . . . . . . 174

PAGE

Barbour, "Uteri at the Onset of Labour and after Delivery," *Transactions of the London Obstetrical Society*, vol. xxviii., p. 73 . . . . . . . . . . 174

— — "Abdominal Palpation in Pregnancy," *International Clinics*, 7th Series, vol. i., p. 295 . . . . . . 152

Barnes, "On the Mechanism of Labour, More Especially with Reference to Nägele's Obliquity and the Influence of the Lumbo-Sacral Curve," *Transactions of the London Obstetrical Society*, vol. xxv., p. 258 . . . 128

Beaucamp, "Ueber das abwartende Verfahren in der Nachgeburtsperiode," *Archiv für Gynäkologie*, Bd. xlii., S. 103 . . . . . . . . . . 181

Beyer, "Bemerkungen über die Diagnose des Placentarsitzes und über Cervixverhältnisse," *Centralblatt für Gynäkologie*, 1895, No. 7, S. 182; *Zur physiologischen und pathologischen Morphologie der Gebärmutter*, 1885, S. 625 . . . . . . . . . . 72

Bidder, "Zur Beurtheilung der Kristeller'schen Expressions-Methode bei Kopflagen," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1878, Bd. iii., S. 241 . . . . . 155

Bordé, *Year Book of Treatment*, 1893, p. 370 . . . . . 206

Börner, *Ueber den Puerperalen Uterus*, Graz, 1875 . 195, 197, 198

Breslau, "Ueber die Frankenhäuser'sche Entdeckung das Geschlecht des Fötus durch Zählung der Herztöne erkennen zu können," *Monatsschrift für Geburtskunde*, Bd. xv., S. 437 . . . . . . . . . . 89

Brikner, "A Short Umbilical Cord as a Cause of Dystocia, with a Description of a New Symptom" (*American Journal*, 1898), *Jahresbericht über die Leistungen und Fortschritte in der Gesammten Medicin*, 1899, Bd. ii., S. 629 . . . . . . . . . . 95

Brühl, "Untersuchungen über den Stand des Kopfes und über die Eindrückbarkeit desselben in den Beckenkanal als prognostisches Moment der Geburt," *Archiv für Gynäkologie*, Bd. xxvi., S. 88 . 79, 112, 145, 149

Brützer, "Ein Beitrag zur Wochenbettsdiätetik," *Zeitschrift für Geburtshülfe und Gynäkologie*, Bd. xxxvii., S. 391 . 205

Buckhardt, "Zur Technik der Placentarlösung," *Centralblatt für Gynäkologie*, 1897, No. 45, S. 1344 . . . . . 180

PAGE

Budberg, "Methode der Placentarexpression," *Deutsche Medicinische Wochenschrift*, 1898, No. 43, S. 683 . . 182

Budin et Tarnier, *Traité des Accouchements*, t. iv., p. 73, 1901 . 168

—— "Note sur un procédé qui permet de mieux constater les caractères de la région dorsale du foetus lorsqu'on pratique la palpation abdominale et de mieux entendre les bruits du coeur foetal lorsqu'on pratique l'auscultation à la fin de la grossesse," *Le Progrès Médical*, 1881, No. 21, p. 397 . . . . . 118, 137

Bumm, "Zur Aetiologie des Nabelschnurgeräusches," *Archiv für Gynäkologie*, Bd. xxv., S. 277 . . . . . 100

Byers, "The Prevention and Treatment of Post-partum Hæmorrhage," *Lancet*, 1900, vol. ii., p. 793; "The Management of the Third Stage of Labour," *Lancet*, 1898, vol. i. . . . . . . . . . 178

Cameron, "A New Theory as to the Position of the Fœtus *in Utero*," *British Medical Journal*, 1896, vol. i., p. 525 31, 74, 119

Carlile, *Medical Record of New York*, 1880, p. 554 . . . 92

Carson, "Turning by External Manipulation," *Medical Times and Gazette*, 1864, vol. ii., p. 469 . . . . . 169

Caruso, "Ueber den normalen Sitz der Placenta," *Centralblatt für Gynäkologie*, 1897, No. 28, S. 912 . . . . 75

Cazeaux and Tarnier, *Obstetrics*, English translation, 1885 (Boivin, Cruveilhier, Dubois, Pajot, Desormeaux) 31, 32, 192

Champneys, "The Mechanism of the Third Stage of Labour," *Transactions of the London Obstetrical Society*, 1887, vol. xxix., p. 117 . . . . . . . . 174

—— "The Uterine Bruit," *Lancet*, 1886, vol. ii., p. 123 . . 104

Charles, *La Flandre Médicale*, Juin 13, 1895; from the *Annual of the Universal Medical Sciences*, Sajous, 1896 . . 205

Churchill, "Rhythm of the Heart of the Fœtus," *Dublin Quarterly Journal*, 1855, vol. xix., p. 327 . . 87, 93

Cohnstein, "Die Aetiologie der normalen Kindeslage," *Monatsschrift für Geburtskunde*, Bd. xxxi., S. 141 . . . 45

Coleman, "Cephalic Version by the External Bi-polar Method," etc., *American Journal of Obstetrics*, 1877, vol. x., p. 631 166

PAGE

Correspondence, *British Medical Journal*, 1898, vol. ii., p. 927 and p. 1009 . . . . . . . . . . 4

Courty, *Dictionnaire des Sciences Médicales* . . . 192, 198, 201

Credé, "Abwehr gegen Ahlfeld's 'Berichte und Arbeiten aus der Geburtshülflich-Gynäkologischen Klinik zu Giessen, 1881-1882,'" *Archiv für Gynäkologie*, Bd. xxiii., S. 302 . . . . . . . . . . 176

—— "Die Behandlung der Nachgeburt bei regelmässigen Geburten," *Archiv für Gynäkologie*, Bd. xxxii., S. 96, 1888 . . . . . . . . . . 176, 182

—— *Klinische Vorträge über Geburtshülfe*, 1853, S. 599-600 . 175

—— "Ueber die zweckmässigste Methode der Entfernung der Nachgeburt," *Monatsschrift für Geburtskunde*, 1861, Bd. xvii., S. 274 . . . . . . . . 175

—— "Ueber die zweckmässigste Methode der Entfernung der Nachgeburt," *Archiv für Gynäkologie*, Bd. xvii., S. 271 . . . . . . . . . . 177

—— "Vortrag über die von ihm geübte Methode der Entfernung des Fruchtkuchens bei natürlicher Geburt," *Versammlung deutscher Naturforscher und Aerzte in Königsberg*, 1860; *Monatsschrift für Geburtskunde*, Bd. xvi., S. 337 . . . . . . . . . . 175

—— and Leopold, *A Short Guide to the Examination of Lying-in Women* (Extract from the German), London, 1894 . . . . . . . . . . 4, 54

Croft, "Difficulty of Diagnosis between Pregnancy and Tumours of the Abdomen," *Lancet*, 1860, vol. i., p. 85 . 65

Croom, *A Study of the Bladder during Parturition* . . . 196

Cumming, "On the Uterine Souffle and the Fœtal Heart," *Edinburgh Medical Journal*, 1875, vol. xxi., pt. 1, p. 230 . . . . . . . . . . 88, 90

Dakin, *Handbook of Midwifery*, 1897 . . . 48, 99, 199, 202

Deleurye, *Des obstacles de la part de la mère qui rendent l'accouchement contre nature*, deuxième édition, 1777, p. 353 . . . . . . . . . . 31

Depaul, "Auscultation obstétricale," *Dictionnaire des Sciences Médicales*, 1867, p. 301 . . . 88, 97, 98, 100, 105, 107

PAGE

Devilliers, "Recherches sur le diagnostic et la valeur du bruit de souffle ombilicale," *L'Union Médicale*, 1854, No. 11, p. 44; *Monatsschrift für Geburtskunde*, Bd. iii., S. 234 . . . . . 99

Dewees, *System of Midwifery*, Philadelphia, 1847, p. 103 . . 33

Dohrn, "Zur Behandlung der Nachgeburtszeit." *Deutsche Medicinische Wochenschrift*, 1880, No. 41, S. 545 . . 181

Dubois, "Mémoire sur la cause des présentations de la tête," *Mémoires de l'Academie Royale de Médicin*, 1833, t. ii., p. 265 (from Lusk) . . . . . 44

Duncan, "The Internal Surface of the Uterus after Delivery," *British and Foreign Medico-Chirurgical Review*, N.S., vol. xii., p. 506, 1853 . . . . . 191

—— "On the Shortness of the Cord as a Cause of Obstruction to the Natural Progress of Labour," *Transactions of the London Obstetrical Society*, 1881, vol. xxiii., p. 243 . 94

—— *Researches in Obstetrics*, p. 14 . . . . . 44

—— and Hurry, "On Extensions or Retroflexions of the Fœtus, Especially of the Trunk, during Pregnancy," *Transactions of the London Obstetrical Society*, vol. xxvi., p. 206 . . . . . 46

Duval, "Palpation of the Fœtal Heart Impulse in Pregnancy," *Johns Hopkins Hospital Bulletins*, Baltimore, 1897, vol. viii., p. 207 . . . . . 98

Edgar, "The Treatment of Brow Presentation, with Notes of Two Cases," *Glasgow Medical Journal*, March, 1900 165, 171

Edis, "On the Systematic Examination of the Abdomen, with a View to Rectifying Malpresentations of the Fœtus during Labour," *Lancet*, 1872, vol. ii., p. 915 . . 3, 160

Editor, *Lancet*, 1886, vol. ii., p. 72 . . . . . 3, 61

Edwards, *Leçons sur Physiologie*, vol. ix., p. 592 . . . 190

Eisenhart, "Mauriceau - Lachapelle'scher oder Wigand-Martin'scher Handgriff," *Archiv für Gynäkologie*, Bd. xxxvi., S. 301 . . . . . 157

Ellinger, "On Extra-abdominal Version," *American Journal of Obstetrics*, 1877, vol. x., p. 218; "Zur extra-abdominalen Wendung," *Wiener Medizinische Wochenschrift*, 1877, No. 9, S. 198 . . . . . 160

*Encyclopædia Medica*, 1900, vol. vi. . . . . . 49

PAGE

Engelhorn, "Ueber die fötale Pulsfrequenz," *Archiv für Gynäkologie*, Bd. ix., S. 360 . . . . . . . 90

Engelmann, "Massage and Expression or External Manipulations in the Obstetric Practice of Primitive People," *American Journal of Obstetrics*, 1882, vol. xv., p. 601 . 153

Fasbender, "Sicheres diagnostisches Zeichen für die Erkennung des Kopfes bei Steiss- und Schieflage in der Wahrnehmung der sogenannten pergamentartigen Beschaffenheit der Schädelknochen durch die Bauchdecken," *Monatsschrift für Geburtskunde*, Bd. xxxiii., S. 435 . . . . . . . . . . 109, 139

Fehling, *Die Physiologie und Pathologie des Wochenbettes*, Stuttgart, 1897 . . . . . . . . . . 192

— — "Ueber den Mechanismus der Placentarlösung," *Archiv für Gynäkologie*, Bd. xxxii., S. 452 . . . . . 174

Ferguson, "Observations on Labour, Complicated by a Minor Degree of Pelvic Contraction in Multiparæ and Primiparæ," *Edinburgh Medical Journal*, N.S., vol. vi., p. 41 . . . . . . . . . . 80

— — "Uterine Rotation: Its Clinical Importance in Pregnancy and Labour," *Transactions of the Edinburgh Obstetrical Society*, vol. xviii., p. 110 . . . . . 36

Ferkin, "Notes on Labour in Central Africa," *Transactions of the Edinburgh Obstetrical Society*, 1884, vol. ix., p. 28 . 153

Fiedler, "Ueber das Verhalten des Fötalpulses zur Temperatur und zum Pulse der Mutter bei Typhus-abdominalis," *Monatsschrift für Geburtskunde*, Bd. xix., S. 471 . . 93

Fischel, "Zur intra-uterinen Tastbarkeit des fötalen Herzimpulses bei Dexioflexionslagen," *Centralblatt für Gynäkologie*, 1885, No. 49, S. 767 . . . . . . 98

Fischer, "Management of the Third Stage of Labour," *Russkaya Meditsina*, August, 1886, from the *Lancet*, 1886, vol. ii., p. 543 . . . . . . . . 180, 207

Fleishmann, "Tastbarkeit des fötalen Herzstosses bei Gesichtslage I.," *Centralblatt für Gynäkologie*, 1885, No. 52, S. 830 . . . . . . . . . . 98

Fleming, *Text-book of Veterinary Obstetrics*, London, 1896 . 190

PAGE

Fothergill, "A Clinical Note on the Height of the Fundus Uteri during the First Stage of Labour and at the End of the Second Stage," *Transactions of the Edinburgh Obstetrical Society*, vol. xx., p. 113 . . . 41

Frankenhäuser, "Ueber die Herztöne der Frucht und ihre Benutzung zur Diagnose des Lebens, der Stellung, der Lage und des Geschlechts derselben," *Monatsschrift für Geburtskunde*, Bd. xiv., S. 161 . . 89, 96

—— "Ueber Nabelschnurgeräusch, Nabelschnurdruck und Hirndruck," *Monatsschrift für Geburtskunde*, Bd. xv., S. 354 . . . . . . . . . . 99, 101

Freund, "Ueber den heutigen Stand der Nachgeburtsbehandlung," *Archiv für Gynäkologie*, Bd. xxxi., S. 473 . . 181

Frommel, "Zur Prophylaxe der Wochenbettserkrankungen," *Deutsche Medicinische Wochenschrift*, 1892, No. 10, S. 202 . . . . . . . . . . . 5

Galabin, "The Causation of Lateral Obliquity of the Fœtal Head," *Transactions of the London Obstetrical Society*, vol. xxv., p. 252 . . . . . . . . . 128

Gassner, "Ueber die Veränderungen des Körpergewichtes bei Schwangeren, Gebärenden und Wöchnerinnen," *Monatsschrift für Geburtskunde*, Bd. xix., S. 1 . 17, 24

Gerlach, "Ein Fall von Paralyse der Placentar-Insertionsstelle," *Münchener Medicinische Wochenschrift*, 1901, No. 11, S. 427 . . . . . . . . . . 185

Germann, "Dreiundzwanzig Fälle von künstlicher Erregung der Frühgeburt nebst Bemerkungen darüber," *Monatsschrift für Geburtskunde*, Bd. xii., S. 361 . . . 24

Gessner, "Beiträge zur Physiologie der Nachgeburtsperiode," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1897, Bd. xxxvii., S. 17 . . . . . . . . . . 174

Giles, "On the Lochia," *Transactions of the London Obstetrical Society*, 1893, vol. xxxv., p. 190 . . . . . 192

Griffith, In discussion following a paper by Herman on "Subcutaneous Symphysiotomy," read before the London Obstetrical Society, Oct., 1900; *Lancet*, 1900, vol. ii., p. 1076 . . . . . . . . 79, 151

—— In Discussion on Paper by Champneys, *Lancet*, 1886, vol. ii., p. 123 . . . . . . . . . . 104

PAGE

Guyon, "Sur la cause de l'inclinaison de l'utérus à droite pendant la grossesse," *Archives de physiologie normale et pathologique*, 1870, t. iii., p. 75 . . . . . . 36

Haake, "Ueber den Werth der Frankenhäuser'schen Entdeckung, aus der Frequenz der Fötalherzschläge das Geschlecht des Fötus zu bestimmen." *Monatsschrift für Geburtskunde*, Bd. xv., S. 456 . . . . . . 90

Hall, "Detection of the Fœtal Heart Murmur in Gravida, with Report of a Case." *Archives for Pediatrics*, 1897, vol. xiv., p. 905 . . . . . . . . . . 100

Hansen, "Ueber die puerperale Verkleinerung des Uterus," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1886, Bd. xiii., S. 16 . . . . . . . . . . . 206

Hart, "Mechanism and Management of the Third Stage of Labour," *British Medical Journal*, 1901, vol. i., p. 153 183, 208

—— "Some of the Phenomena of Parturition in Their Practical Aspects," *Transactions of the Edinburgh Obstetrical Society*, vol. vi., p. 128 . . . . . . 173

Harvey, "Note on an Acoustic Sign Heard after Death of the Fœtus," *Transactions of the London Obstetrical Society*, 1897, vol. xxi., p. 273 . . . . . . . . 106

Hecker und Buhl, *Klinik der Geburtskunde*, 1861, S. 12 . . 17

Helme, "Histological Observations on the Muscular Fibre and Connective Tissue of the Uterus during Pregnancy and the Puerperium," *Transactions of the Royal Society of Edinburgh*, vol. xxxv., part 2, p. 1, 1890 . . . . . . . . . . . . . 189

Hennig, "Ueber die Häufigkeit der Herzschläge beim Fötus und bei Neugeborenen von verschiedenen Geschlechtern," *Monatsschrift für Geburtskunde*, Bd. xv., S. 449 . . . . . . . . . . . . 89

Herman, "A Clinical Lecture Delivered at the London Hospital," *Clinical Journal*, August, 1900, p. 227 . . 17

—— In Discussion on Paper by Champneys, *Lancet*, 1886, vol. ii., p. 123 . . . . . . . . . . . 104

—— In Discussion on Paper by Swayne, *Transactions of London Obstetrical Society*, 1887, vol. xxix., p. 405 . 140

PAGE

Herman and Fowler, "On the Effect of Ergot on the Involution of the Uterus," *Transactions of the London Obstetrical Society*, 1888, vol. xxx., p. 85 . . . . . 196, 205

Hicks, "On a New Method of Version in Abnormal Labour," *Lancet*, 1860, vol. ii., pp. 28, 55; "Combined External and Internal Version," *Transactions of the London Obstetrical Society* (1863), 1864, vol. v., p. 219 . . 160

—— "On the Contractions of the Uterus during the Whole of Pregnancy," *Lancet*, 1888, vol. i., p. 65 . . . 11

—— "Note on the Muscular Susurrus in Relation to the Fœtal Heart Sounds," *Transactions of the London Obstetrical Society*, 1874, vol. xv., p. 187 . . . . 106

Hochsinger, *Die Auskultation des kindlichen Herzens* . . 102

Hoffheinz, "Der Höhenstand des Fundus Uteri bei der Geburt," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1888, Bd. xv., S. 433 . . . . . . . . 42

Höfft, "Beobachtungen über Auskultation der Schwangern," *Neue Zeitschrift für Geburtskunde*, 1838, Bd. vi., H. 1, S. 1 96

Hofmeier, "Zur Prophylaxis der Wochenbettserkrankungen," *Deutsche Medicinische Wochenschrift*, 1891, No. 49, S. 1321 . . . . . . . . . . . . 5

Hohl, *Die Geburtshülfliche Exploration*, Halle, Bd. i., S. 28, 80, 170 . . . . . . . . . 88, 92, 93

Hüter, "Ueber den Fötalpuls," *Monatsschrift für Geburtskunde*, Bd. xviii., Supplement-Heft, S. 23 . . 88, 93, 100

Jardine, "Lecture on the Management of Normal Labour and the Puerperium," *Scottish Medical and Surgical Journal*, 1898, vol. ii., p. 405 . . . . . . . 61

Jellet, *A Short Textbook of Midwifery*, 1899 . . . 58, 80, 208

—— "The Dublin Method of Effecting the Delivery of the Placenta," *Dublin Medical Journal*, 1900, vol. cix., p. 412 175, 177

Jones, *The Year Book of Treatment*, 1895, p. 349 . . . . 65

Kauffmann, "Nabelschnurumschlingungen als Geburtshinderniss," *Monatsschrift für Geburtskunde*, Bd. xiv., S. 175 95

Kehrer, "The Causes of the Variation of the Fœtal Pulse during Uterine Contraction," *American Journal of Obstetrics*, 1879, vol. xii., p. 192; *Transactions of the German Gynæcological Congress* . . . . . . 94

PAGE

Kehrer, "Zur Aetiologie des Nabelschnurgeräusches," *Archiv für Gynäkologie*, Bd. xii., S. 258 . . . . . . 99

Keiffer, *La Flandre Médicale*, Juin 13, 1895; from the *Annual of the Universal Medical Sciences*, Sajous, 1896 . . 205

Kennedy, *Observations on Obstetric Auscultation*, 1833, Dublin 99, 105

—— "Obstetric Auscultation," *Lancet*, 1830-31, vol. i., p. 495 . 105

— "Physiological and Practical Observations on the Utero-placental Circulation and the Phenomenon of the Placental Soufflet, with its Utility in Detecting the Existence of Pregnancy, and the Death of the Fœtus in Utero," *Dublin Hospital Reports*, 1830, vol. v., p. 231 105

Kergaradec, *Mémoire sur l'auscultation appliquée à l'étude de la grossesse*, Paris, 1832 . . . . . . . 87, 97

Knapp, "Ueber die Berechtigung der Ausschabung der Gebärmutter bei verzögerter Rückbildung derselben im Wochenbett," *Archiv für Gynäkologie*, Bd. lv., S. 417 192, 200, 215, 217

Kosminski, "Beitrag zum aseptischen Verfahren bei gewissen Geburtshülflichen Operationen," *Centralblatt für Gynäkologie*, 1897, No. 29, S. 913 . . . . . . 3

Kristeller, "Neues Entbindungsverfahren unter Anwendung von äusseren Handgriffen," *Berliner Klinische Wochenschrift*, 1867, No. 6, S. 56; "Neues Entbindungsverfahren unter Anwendung äusserer Handgriffe," *Monatsschrift für Geburtskunde*, Bd. xxix., S. 337 . 153

Küneke, "Ueber das Erkennen der Zwillings-schwangerschaft," *Monatsschrift für Geburtskunde*, Bd. xxi., S. 319 . . . . . . . . . . . . 15, 97

Küstner, *Müller's Handbuch der Geburtshülfe*, vol. ii., S. 541 (from Lusk) . . . . . . . . . . 22

Labat, "Note sur la version par manœuvres externes pendant le travail," Revue clinique, *Annales de Gynécologie*, 1881, t. xv., p. 37 . . . . . . . . . . 167

Lefour, "Version céphalique par manœuvres externes dans les présentations pelviennes et circulaires du cordon autour du col foetal," *Archives de Tocologie*, 1888, t. xv., p. 524 . . . . . . . . . . . 168

Leishman, *A System of Midwifery*, 1880 . . . . 20, 128

PAGE

Leopold, "Die Diagnose des Placentarsitzes in der Schwangerschaft und während der Geburt," *Geburtshülfe und Gynäkologie*, Leipzig, 1895 . . . . . . . 72

—— "Zur Diagnose des Placentarsitzes," *Centralblatt für Gynäkologie*, 1895, No. 12, S. 305 . . . . . . 72

—— "Dritter Beitrag zur Verhütung des Kindbettfiebers," *Archiv für Gynäkologie*, Bd. xxxv., S. 149 . . 3, 110

—— International Medical Congress, Moscow, August, 1897 . 61

—— "Studien über die Uterusschleimhaut während Menstruation, Schwangerschaft und Wochenbett," *Archiv für Gynäkologie*, Bd. xii., S. 417 . . . . 201, 204

—— "Ueber die äussere Untersuchung in der Geburtshülfe," *Münchener Medicinische Wochenschrift*, 1897, No. 40 . 54

—— und Goldberg, "Ueber die Entbehrlichkeit der Scheidenausspülungen und Auswaschungen bei regelmässigen Geburten und über die grösstmögliche Verwerthung der äusseren Untersuchung in der Geburtshülfe," *Archiv für Gynäkologie*, Bd. xl., S. 439 . . . 3

—— und Haake, "Ueber 100 Sectiones Caesareae," *Archiv für Gynäkologie*, Bd. lvi., S. 1 . . . . . . 73

—— und Orb, "Die Leitung normaler Geburten nur durch äussere Untersuchung," *Archiv für Gynäkologie*, Bd. xlix., S. 304 . . . . . . . . . . 2, 54

—— und Pantzer, "Die Beschränkung der inneren und die grösstmögliche Verwerthung der äusseren Untersuchung in der Geburtshülfe," *Archiv für Gynäkologie*, Bd. xxxviii., S. 330 . . . . . . . . 3, 54

—— und Spörlin, "Die Leitung der regelmässigen Geburten nur durch äussere Untersuchung," *Archiv für Gynäkologie*, Bd. xlv., S. 337 . 2, 7, 9, 54, 80, 83, 98, 132, 144

—— und Zweifel, *Lehrbuch für Hebammen*, Leipzig, 1897 54, 180

Levret, *L'art des accouchements*, t. i., 1761 . . . . . . 31

Lichtenstein, "Gegen den Credé'schen Handgriff," *Zeitschrift für praktische Aerzte*, 1897, No. 4 . . . . . 180

Litzmann, "Beiträge zur Physiologie der Schwangerschaft," *Archiv für Gynäkologie*, Bd. x., S. 409 . 28, 41, 182, 183

—— *Geburt bei engen Becken*, Leipzig, 1884 . . . 80, 146

Loviot, "Des mutations de position par manœuvres externes pendant la grossesse," *Bulletins et Mémoires de la*

PAGE

*Société Obstetricale et Gynécologique de Paris*, 1889 (for 1888), p. 155 . . . . . . . . . . 170

Lüdecke, *Der Höhenstand des Fundus Uteri in der Austreibungs- und Nachgeburtsperiode*, Inaugural Dissertation, Würzburg, 1889 . . . . . . . 41, 42, 183

Lusk, *Science and Art of Midwifery*, 1896 . 20, 29, 141, 171, 192, 193, 195, 198

Macdonald, "The Antegenetic Discovery of Fœtal Sex," *Lancet*, 1883, vol. i., p. 222 . . . . . . . 92

MacHarg, "An Analytical Account of Fifty-seven Cases of Puerperal Infection," *British Medical Journal*, 1900, vol. i., p. 373 . . . . . . . . . 211

MacLennan, "On Two Cases of Dystocia Arising from Relative Shortness of the Umbilical Cord," *British Medical Journal*, 1897, vol. ii., p. 446 . . . . . . 94

——— "Measurement of Involution of the Uterus, with Nine Charts," *Glasgow Medical Journal*, April, 1900; *Trans. of the Glasgow Obstetrical Society*, vol. ii., p. 139 . 200

——— "Auscultation in the Management of Labour," *Transactions of the Glasgow Obstetrical Society*, vol. ii., p. 209; *Glasgow Medical Journal*, November, 1900 . . . 86

——— "On the Position of the Gravid Uterus at the Onset of Labour with Regard to Latero-flexion and Rotation," *Glasgow Medical Journal*, July, 1899; *Transactions of the Glasgow Obstetrical Society*, vol. i. . . . . . 28

McCann, "On the Importance of the Examination of the Abdomen during the Puerperium," *British Medical Journal*, 1896, vol. ii., p. 192 . . . . 194, 195, 199, 201

Martin, "Zur geburtshülflichen Auskultation," *Monatsschrift für Geburtskunde*, Bd. vii., S. 170 . 31, 96, 105, 106, 119

Massmann, "Fall von Nabelschnurgeräusch," *Monatsschrift für Geburtskunde*, Bd. iv., S. 81 . . . . . . 100

Mayor, *Bibliothèque universelle de Genève*, Novembre, 1818, t. ix., p. 248 . . . . . . . . . . . 86

Meeh, "Warum kommt das Kind am häufigsten in der Kopfendlage zur Welt?" *Archiv für Gynäkologie*, Bd. xx., S. 185 . . . . . . . . . . . . 44

Meigs, *Obstetrics*, 1849, p. 204 . . . . . . . . 33

Meyer, "Zwei zeltene Auskultations-Phänomene bei einer Schwangeren," *Centralblatt für Gynäkologie*, 1897, No. 28, S. 904 . . . . . . . . . . . . 104

PAGE

Montgomerie, *Symptoms of Pregnancy*, 1837, p. 110 . . . 20

Mulert, "Ueber die Einschränkung der inneren Untersuchung der Gebärenden," *Deutsche Medicinische Wochenschrift*, 1897, No. 7, S. 108 . . . . . . . . . 5, 9

Müllerheim, *Die äussere Untersuchung der Gebärenden*, Berlin, 1895 . . . . . . 3, 8, 48, 73, 110, 118, 119, 124

Mundé, "Diagnosis and Treatment of Obstetric Cases by External (Abdominal) Examination and Manipulation." *American Journal of Obstetrics*, 1879, vol. xii., p. 490; 1880, vol. xiii., p. 707 . 4, 14, 24, 54, 113, 119, 156, 160, 165, 166, 177, 193

Murphy, *Lectures on Parturition*, p. 106 . . . . . . 33

Murray, G. C. P., "On the Position of the Fœtus *in Utero* by Means of External palpation," *Lancet*, 1858, vol. i., p. 262 . . . . . . . . . . 3

Murray, J. Milne, "On Deflection and Rotation of the Pregnant and Puerperal Uterus," *Edinburgh Medical Journal*, 1897, N.S., vol. i., p. 160; "Deflection and Rotation of the Pregnant Uterus," *British Medical Journal*, 1896, vol. ii., p. 1779 . . . 32, 35, 196, 202

Nägele, *Die Geburtshülfliche Auskultation*, 1838 . 18, 88, 99, 103, 104

Nagle, "On the Use of the Stethoscope for the Detection of Twins *in Utero*, the Presentation," etc., *Lancet*, 1830-31, vol. i., p. 232 . . . . . . . . 97, 105

Napier, "Umbilical Cord Round the Child's Neck as a Cause of Delayed Labour, and sometimes of Infantile Death," *Transactions of the Edinburgh Obstetrical Society*, 1882-83, vol. viii., p. 26 . . . . . . 94

Naylor, "Observations Demonstrating the Influence of Digestion in the Mother upon the Frequency of the Fœtal Pulse," *Edinburgh Medical Journal*, 1876, vol. xxi., part 2, p. 1004 . . . . . . . . . 93

Nivert, *De la version céphalique par les manœuvres externes dans les présentations vicieuses du fœtus*, Paris, 1862 (from Pinard) . . . . . . . . . . 162

Palm, "Ueber die Diagnose des Placentarsitzes in der Schwangerschaft und die Beziehung der Placenta marginata zur Tubenecke," *Zeitschrift für Geburtshülfe und Gynäkologie*, 1893, Bd. xxv., S. 315 . . . . 73

PAGE

Parvin, *The Science and Art of Obstetrics.* 1887. p. 349 . . 10

Pawlik, "Beitrag zur äusseren Untersuchung der Schwangeren," *Wiener Medizinische Blätter.* 1891. No. 21 . . 111

Pelzer, "Ueber das Credé'sche Verfahren in der Nachgeburtsperiode," *Archiv für Gynäkologie.* Bd. xlvii., S. 447 . 181

Pfannkuch, "Ueber den Einfluss der Nachbarorgane auf die Lage und Involution des puerperalen Uterus," *Archiv für Gynäkologie*, Bd. iii., S. 327 . 34, 36, 195, 196, 198

Pinard, *Traité du palper abdominal au point de vue obstétrical et de la version par manœuvres externes.* Paris, deuxième édition, 1889 . 4, 11, 12, 20, 22, 25, 26, 49, 65, 80, 110, 129, 132, 136, 145, 151

— International Medical Congress, Moscow, August, 1897 . 61

Playfair, Discussion on Paper by Edis, *Lancet*, 1872, vol. ii., p. 915 . . . . . . . . . . 164

—— *Obstetrics*, 1876, vol. i. . . . . . . . . . 32, 33

Pollosson, "Sur la diagnostic de la grossesse gemellaire dans certain cas d'hydramnios," *Lyon Médical*, 1898, t. lxxxix., p. 14 . . . . . . . . . 16

Poten, "Beitrag zur Diagnose der Blasenmolenschwangerschaft," *Monatsschrift für Geburtshülfe und Gynäkologie*, 1901, Bd. xiv., Heft 3; *Münchener Medicinische Wochenschrift*, 1901, No. 49, S. 1978 . . . . . . . 20

Quain, *Anatomy*, tenth edition, p 117 . . . . . . 199

Rachel, "Five Cases of Dystocia from Coiling of the Cord around the Neck of the Fœtus," *American Journal of Obstetrics*, vol. xvii., p. 918 . . . . . . . 95

Rainey, *Philosophical Transactions*, 1850 (?) . . . . . 29

Rissmann, "Intra-uterine Krepitation am kindlichen Kopf," *Münchener Medicinische Wochenschrift*, 1901, No. 25 . 109

Rivière, "Étude sur la valeur de la palpation de l'épaule," *Annales de Gynécologie*, 1887 (1886), t. xxvi., p. 252 . 119

Rotter, "Ueber fühlbares Uteringeräusch," *Archiv für Gynäkologie*, Bd. v., S. 539 . . . . . . . . 105

Sandberg, "The Management of Labour by External Examination," *Journal of the American Medical Association*, 1897, vol. xxviii., p. 968 . . . . . . . . 83, 128

Scanzoni, *Lehrbuch der Geburtshülfe*, vierte Auflage, S. 162 . 100

Schatz, "Die Umwandlung von Gesichtslage zu Hinterhauptslage durch alleinigen äusseren Handgriff," *Archiv für Gynäkologie*, Bd. v., S. 306 . . . . . 120, 170

PAGE

Schatz, "Ueber die Hinterscheitelbeinlagen." *Münchener Medicinische Wochenschrift*, 1901, No. 41, S. 1626 . 130

—— "Ueber die schon in der Schwangerschaft und in der ersten Hälfte der Geburt zu stellende Diagnose der Umschlingung der Nabelschnur," *Archiv für Gynäkologie*, Bd. xxv., S. 158 . . . . . . . 94

Schneider, "Beobachtungen über die Verkleinerung des Uterus in den ersten acht Tagen des Puerperiums," *Monatsschrift für Geburtskunde*, Bd. xxxi., S. 357 . 196-198

Schröder, *Geburtshülfe*, vierte Auflage, 1874 . . 24, 28, 45, 91

—— *Geburtshülfe*, Olshausen und Veit, 1888 . . 5, 98, 100, 135

—— *Schwangerschaft, Geburtshülfe und Wochenbett*, S. 187 . 198

—— und Scanzoni, *Lehrbuch der Geburt*, S. 355 . . . . 199

Schurig, "Beitrag zur Vorausbestimmung des Fötalgeschlechtes durch Zählung des Fötalpulses," *Monatsschrift für Geburtskunde*, Bd. xxi., S. 459, Inaugural Dissertation, Leipzig, 1863 . . . . . . . . . 90

Schwartz, *Die vorzeitigen Athembewegungen*, Leipzig, 1856 (from Hüter) . . . . . . . . . . 100

Seigneux, "De la présentation de la tête, et de mecanisme de son engagement," *Revue Médicale de la Suisse Romande*, Juin, 1896, p. 277 ; Hegar's *Beiträge zur Geburtshülfe und Gynäkologie*, Bd. iv., Heft 3, Leipzig ; "Ueber die Neigung der Uterusachse am Ende der Schwangerschaft und die Kopf Einstellung," *Münchener Medicinische Wochenschrift*, 1901, No. 26 . . . . . 128

Serkudoff, "Contributions to the Determination of the Diminution of the Uterus after Delivery," *Edinburgh Medical Journal*, 1875, vol. xx., p. 965 . 194, 197-199, 202

Simpson, "On the Attitude and Positions, Natural and Preternatural, of the Fœtus *in Utero*," *Obstetric Works*, Priestley and Storer, vol. ii., p. 81 . . . . . 44

Sinclair, "A Series of Ten Successful Cases of Cæsarean Section, *Lancet*, 1901, vol. i., p. 161 . . . . . 203

Smyly, Discussion on Paper by Jellet, *British Medical Journal*, 1900, vol. ii., p. 96 . . . . . . . . . . 177

—— "The Ingleby Lecture on the Lower Uterine Segment and the Contraction Ring," *British Medical Journal*, 1901, vol. i., p. 1189 . . . . . . . . . . 142

PAGE

Smyly, "The Management of the Third Stage of Labour," *British Medical Journal*, 1885, vol. i., p. 9 . . . . 177

Spencer, "The Dangers and Diagnosis of Breech Presentation, and Its Treatment by External Version towards the End of Pregnancy," *British Medical Journal*, 1901, vol. i., p. 1192 . . . . . . . 135, 160, 164, 166

—— "The Diagnosis of Placenta Prævia by Palpation of the Abdomen," *Transactions of the London Obstetrical Society*, 1889, vol. xxxi., p. 203 . . . . . . . 76

Sperling, "Ueber Hernia Uteri gravidi," *Archiv für Gynäkologie*, Bd. xxxvii., S. 308 . . . . . . 26, 64

Spiegelberg, *Textbook of Midwifery*, Sydenham Society's translation, vol. i., p. 67 . . . 23, 25, 91, 100, 105, 177, 183

Spöndli, "Geburtshülfliche Abhandlungen," *Monatsschrift für Geburtskunde*, Bd. iii., S. 198 . . . . . . . 102

Sprengler, "Wendung auf den Kopf durch äussere Handgriffe," *Monatsschrift für Geburtskunde*, 1854, Bd. iii., S. 184 . . . . . . . . . . 160, 166

Steinbach, "Zur Diagnose des Fötalgeschlechts," *Monatsschrift für Geburtskunde*, Bd. xviii., S. 428 . . . . . 90

Stevens and Griffith, "Notes on the Variation in Height of the Fundus Uteri above the Symphysis during the Puerperium, the Conditions which Influence this, and the Practical Conclusions which may be drawn from such Observations," *Transactions of the London Obstetrical Society*, 1895, vol. xxxvii., p. 246 . 193, 199, 203

Stockton-Hough, "An Inquiry Concerning the Relative Influence of the Sex of the Fœtus *in Utero*, on the Mental, Physical, Physiological, Pathological and Developmental Condition of the Mother during Gestation, Lactation and Subsequently," *American Journal of Obstetrics*, 1884, vol. xvii., p. 113 . . 92

Sutugin, "On the Means of Ascertaining the Length of Gestation by Measurement of the Fœtus and Gravid Uterus during the Second Period of Pregnancy," *Edinburgh Medical Journal*, 1875, vol. xx., pt. 2, p. 869 . 23, 34, 42, 91, 113

PAGE

Swayne, "Hydrocephalus as a Complication of Labour," *Transactions of the London Obstetrical Society*, 1887, vol. xxix., p. 405 . . . . . . . . . 139

Tarnier et Chantreul, *Traité des Accouchements*, 1888, vol. i., p. 185 . . . . . . . . . . 10

Temesváry und Bäcker, "Studien aus dem Gebiete des Wochenbettes," *Archiv für Gynäkologie*, Bd. xxxiii., S. 374 . . . . . . . . . 194, 198-201

Tilt, "On the Treatment of Defective Uterine Involution," *Lancet*, 1876, vol. ii., p. 217 . . . . . . . 202

Underhill, "Note on a Case in which the Fœtal Heart was Heard at an Early Period in Pregnancy," *Edinburgh Medical Journal*, 1875, p. 267 . . . . . . . 87

Valenta, "Geburtshülfliche Studien," *Monatsschrift für Geburtskunde*, Bd. xxv., S. 202 . . . . 45, 113, 121

——— *Prager Medizinische Wochenschrift*, 1885, No. 45 . . 98

Veit, *Scanzoni's Beiträge*, Bd. iv., S. 47 (from Lusk) . . . 44

Warden, "Abdominal Examination in Pregnancy and Labour: a Critical Estimate of its Value," *Glasgow Medical Journal*, 1896, N.S., vol. xlvi., p. 442 . 5, 49, 75

Weidemann, *Bemerkungen über die Umschlingungen des Nabelstrangs um die Frucht nebst Beschreibung zweier Fälle von tödlichen Nabelstrangsumschlingungen*, Inaugural Dissertation, Marburg, 1856; *Monatsschrift für Geburtskunde*, Bd. viii., S. 467 . . . . . . . . 95

White, *A Treatise on the Management of Pregnant and Lying-in Women*, Edinburgh, 1791 . . . . . . . 176

Wieland, "Étude sur l'evolution de l'uterus pendant la grossesse et sur le retour de cet organ a l'étât normal après l'accouchement," *Thèse de Paris*, 1858 . . 199

Wilke, "Das Geburtsgewicht der Kinder beim engen Becken," *Hegar's Beiträge zur Geburtshülfe und Gynäkologie*, Bd. iv., Heft 2, Leipzig; *Münchener Medicinische Wochenschrift*, 1901, No. 24 . . . . . . . . . 145

Winkler, "Ueber die Stellungen des graviden und puerperalen Uterus," *Jenaische Zeitschrift für Medicin*, Bd. iv., Heft 3-4, S. 522 . . . . . . . . 33, 34, 36

Wygodski, "Eine siebenmalige Nabelschnurumschlingung um den Hals des Kindes als Geburtshinderniss," *Centralblatt für Gynäkologie*, 1895, No. 21, S. 561 . . 94

PAGE

Zepuder, "Neue Beobachtungen über den Werth der Frankenhäuser'schen Theorie," *Zeitschrift für praktische Heilkunde*, 1863, No. 2; *Monatsschrift für Geburtskunde*, Bd. xxi., S. 311 . . . . . . . 90

Zweifel, "Ueber die Bestimmung der Schwangerschaftszeit durch Messungen," *Archiv für Gynäkologie*, Bd. xxii., S. 491 . . . . . . . . . . 24, 91

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